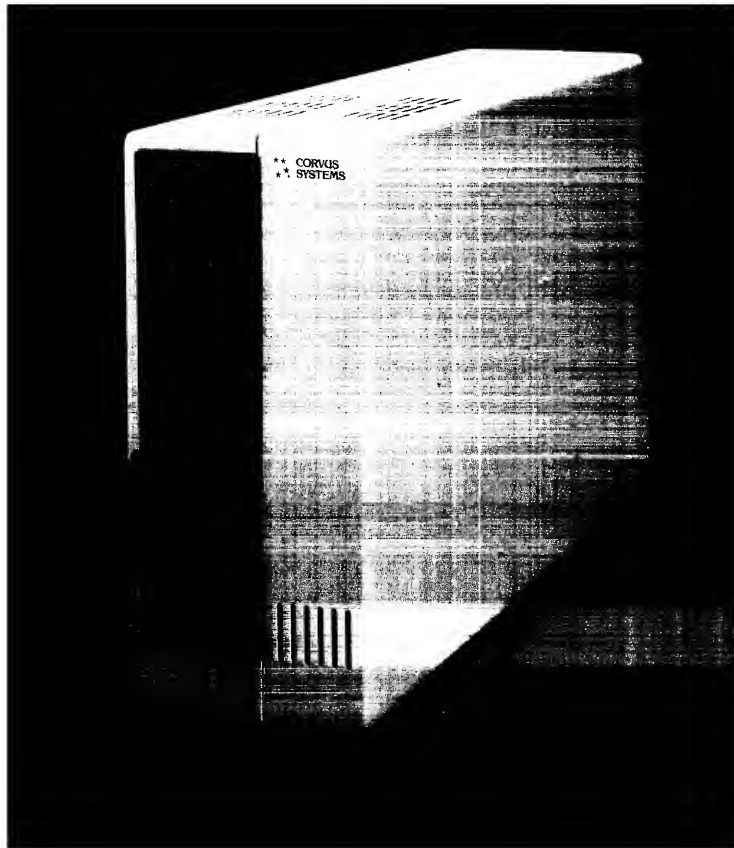


# THE CORVUS SERVICE MANUAL



Floppy Disk Drive

\*\*\*CORVUS SYSTEMS

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**CORVUS SYSTEMS  
CONCEPT PERSONAL WORKSTATION  
8" FLOPPY DRIVE  
SERVICE MANUAL**

PART NO.: 7100-04702  
DOCUMENT NO.: CCC/12-01/1.1  
RELEASE DATE: JULY 10, 1983

This document contains three types of notations. These are, in increasing order of importance, **NOTE**, **CAUTION**, and **WARNING**. The **NOTE** indicates some action to be taken to speed or simplify a procedure. The **CAUTION** indicates that potential damage to the equipment or user data exists, and care should be taken to avoid this. The **WARNING** indicates that potential harm or injury to the service technician or operator exists, and extreme care should be taken to avoid these.

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## **CORVUS DEALER SERVICE**

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## LIST OF ASSEMBLY DRAWINGS AND SCHEMATICS

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## CORVUS DEALER SERVICE

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## SPECIFICATIONS

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## DRIVE SPECIFICATIONS

### Tandon Model TM848-01

#### MECHANICAL

|         |                            |
|---------|----------------------------|
| Height: | 2.30 inches                |
| Width:  | 8 inches                   |
| Length: | 13.125 inches              |
| Weight: | 6 pounds with power supply |

#### ELECTRICAL

|                |                                       |
|----------------|---------------------------------------|
| +5 VDC Power:  | +5 volts $\pm$ 5%, 0.75 amp typical   |
| +24 VDC Power: | +24 volts $\pm$ 10%, 0.92 amp typical |
| Start Current  | 2.5 amps, 400 msec on 24 volts        |

#### ENVIRONMENTAL

|                                   |               |
|-----------------------------------|---------------|
| Operating Temperature:            | 4.4°C to 46°C |
| Storage Temperature:              | -40°C to 71°C |
| Wet Bulb Temperature:             | 26°C maximum  |
| Noncondensing Operating Humidity: | 20% to 80%    |

#### RELIABILITY

|              |                       |
|--------------|-----------------------|
| MTBF         | 10,000 power-on hours |
| MTTR         | 30 minutes            |
| Error Rate:  |                       |
| Soft Read:   | 1 in $10^9$ bits      |
| Hard Read:   | 1 in $10^{12}$ bits   |
| Seek Errors: | 1 in $10^6$ seeks     |

#### PERFORMANCE

|   |                     |
|---|---------------------|
| Head Wear Guarantee:                          | 15,000 media hours  |
| Number of Tracks:                             | 77                  |
| Track to track access time:                   | 3 milliseconds      |
| Head Settling Time:                           | 15 milliseconds     |
| Average Access Time, including head settling: | 91 milliseconds     |
| Motor Start Time:                             | 0.5 seconds maximum |
| Disk Rotational Speed                         | 360 RPM             |
| Instantaneous Speed Variation:                | $\pm$ 1.0%          |
| Flux Changes per inch, inside track:          | 6536 FCI            |
| Transfer Rate:                                | 250K BPS            |
| Unformatted Recording Capacity:               | 0.4 MBytes          |
| IBM Format Recording Capacity:                | 0.3 MBytes          |
| Recording Method:                             | FM                  |

**CHAPTER 1**  
**OVERVIEW**

## CHAPTER 1 OVERVIEW

### 1.0 Scope of Manual

This manual is designed for service technicians who perform maintenance or warranty service on the Corvus Floppy Disk Drive and the interface. A troubleshooting guide is included which will direct the technician to the appropriate procedure. Except for the power supply, the internal parts of the drive are not replaceable. In such cases, the drive should be returned to Corvus via a Return Merchandise Authorization (RMA).

All information in this manual applies to the single-sided, single-density drive only. Subsequent models will be covered in a separate manual or addendum.

This first chapter will briefly describe the drive, the interface, and the diskettes.

### 1.1 General Description

The Corvus Floppy Disk Drive provides an additional data storage and boot device for the Corvus Concept Personal Workstation. The floppy is a single-sided, single-density drive which uses eight-inch standard floppy diskettes. The interface is composed of a single Interface Controller Card and a cable. The card plugs into slot three of the Concept base unit.

#### 1.1.1 Drive Assembly

The mechanism and internal electronics are manufactured by Tandon Corporation™. The power supply is provided by Corvus Systems and is incorporated in the drive cabinet.

All electronic components of the drive are mounted on a single circuit board located in the drive's chassis. At the rear of the drive cabinet is the power receptacle, fuse holder, on/off switch, and interface connectors. The power supply is mounted to the floppy chassis assembly.

#### 1.1.2 Interface Description

The floppy interface is composed of an Interface Controller Card and a fifty-pin flat ribbon cable. Some drives use a fifty-pin twisted pair cable, which is acceptable. The Controller uses an intelligent Floppy Controller chip and associated circuits. Data transfers between the drive and the Controller are in the form of raw serial data (clock pulses included). Data transfers between the Controller and the Concept are eight-bit parallel.

The Interface Controller Card has three adjustment potentiometers: bias voltage, range, and precomp adjust. These adjustments will be covered in Chapter Four.

### 1.2 Diskettes

The floppy operates with standard eight-inch, single-sided, single density, soft-sector diskettes.

For diskette insertion, operator access is provided via a slot located on the front of the drive. The Diskette Lever must be turned counterclockwise, to the straight-up position, for diskette loading. Once the diskette is fully inserted, the diskette lever is turned clockwise, until perpendicular with the door, and the diskette is now loaded.

The floppy drive is equipped with a Write Protect Sensor. This sensor operates in conjunction with the diskette which has a slot cut in the protective jacket. When the slot is UNCOVERED, the diskette is write PROTECTED. The slot must be covered to write on the diskette.

#### 1.2.1 Care and Handling of Diskettes

It is important that the diskette be cared for, handled, and stored properly so that the integrity of the recorded data is maintained. A damaged or contaminated diskette can impair or prevent recovery of data, and can result in damage to the read/write heads of the drive.

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Following these guide lines will increase diskette reliability and extend the life of the diskettes:

- 1) Keep the diskettes away from magnetic fields. Don't place diskettes on televisions or monitors.
- 2) Keep diskettes in their protective jackets when not in use. Never touch the precision surface of the diskettes.
- 3) Do not bend or fold the diskettes. Be careful when inserting them into the drive.
- 4) Store diskettes at room temperatures in a covered container away from contamination such as smoke or spilled liquids.
- 5) **REMOVE DISKETTES BEFORE POWERING ON OR OFF THE DRIVE.** Random spikes during power on or off can cause noise to be written on the diskette and render it unusable.

Floppy diskettes have an operating life of about 40 hours. This time varies depending on environment and usage. It is recommended that back-up copies of all valuable data be kept in a safe place.

**CHAPTER 2**  
**FUNCTIONAL DESCRIPTION**



## CHAPTER 2

### FUNCTIONAL DESCRIPTION

#### 2.0 Scope of Chapter

This chapter will describe the functional operation of the Drive Mechanism, Drive Electronics, and Interface Controller. The electronics will be presented at a block diagram level.

#### 2.1 Drive Mechanism

The drive consists of a spindle drive system, a head positioning system, and a read/write/erase system.

The diskette is accurately positioned when inserted by plastic guides. The position is ensured by the backstop and disk ejector. Closing the diskette lever activates the cone and clamp system, resulting in centering of the diskette and clamping of the diskette to the drive hub. The drive hub is driven at a constant speed of 360 RPM by a servo-controlled brushless DC motor. The head is loaded into contact with the recording medium whenever the diskette lever is latched.

The head is positioned over the desired track by means of a stepper motor and band assembly and its associated electronics. The stepper motor rotates 3.6 degrees to cause a one-track linear movement. When a write-protected diskette is inserted into the drive, the Write Protect Sensor disables the write electronics of the drive, and a Write Protect status output signal is available to the interface.

When performing a write operation, a 0.013-inch wide (nominal) data track is recorded. This track is then tunnel erased to 0.012 inch (nominal). Tunnel erasing helps prevent crosstalk between tracks by erasing the outer edges and increasing the space between the tracks.

Data recovery electronics include a low-level head amplifier, a differentiator, a zero crossing detector, and digitizing circuits.

In addition, the drive has the following sensors:

1. A track 00 sensor that senses when the Head Carriage Assembly is positioned at Track 00.
2. The two index sensors, each of which consists of an LED light source and a phototransistor.
3. The Write Protect sensor disables the write electronics whenever the write-enable tab is removed from the diskette.

#### 2.2 Block Diagram Description

Figure 2-1 is a functional block diagram of the drive. It should be referred to in conjunction with the following sections. The drive consists of six functional groups:

- |                          |                                 |
|--------------------------|---------------------------------|
| 1) Index Pulse Shaper    | 4) Carriage Position Control    |
| 2) Drive Status Logic    | 5) Write/Erase Control          |
| 3) Spindle Drive Control | 6) Read Amplifier and Digitizer |

##### 2.2.1 Index Pulse

An index pulse is provided to the Controller via the index pulse interface line. The index circuitry consists of an index LED, a phototransistor, and a pulse shaping network. As the index hole in the disk passes an index LED-phototransistor, light from the LED strikes the phototransistor, causing it to conduct. The signal from the index phototransistor is passed on to the pulse shaping network, which produces a pulse for each hole detected. This pulse is presented on the index pulse interface line.

##### 2.2.2 Drive Status Logic

There are five status logic lines: Write Protect, Track 00 Sensor, Two-Sided Disk, Ready, Disk Change (see section 2.3).

##### 2.2.3 Spindle Drive Control

The spindle drive system consists of a spindle assembly driven through a drive belt by a brushless DC motor/tachometer. The servo electronics are located on the printed circuit board.

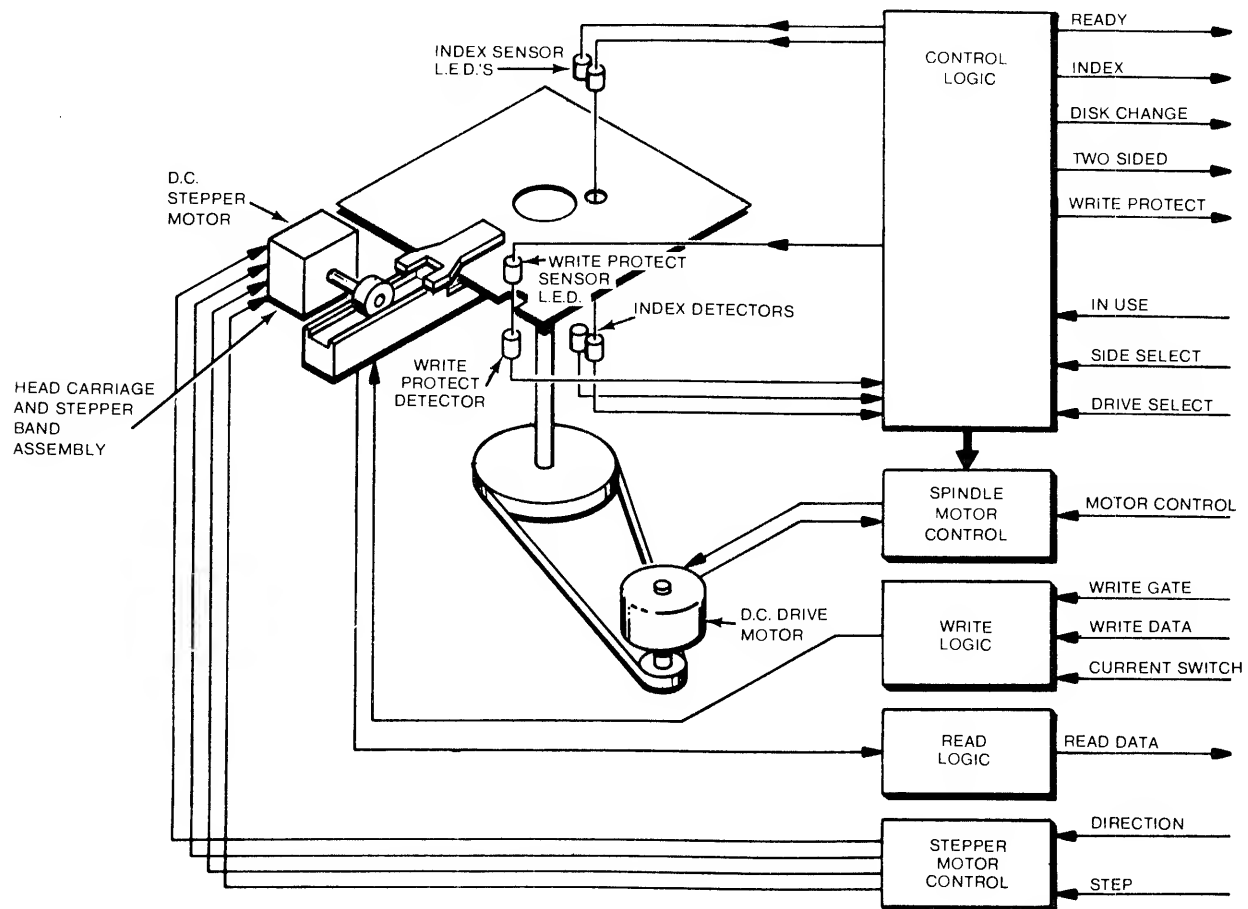


Figure 2-1. Functional Block Diagram

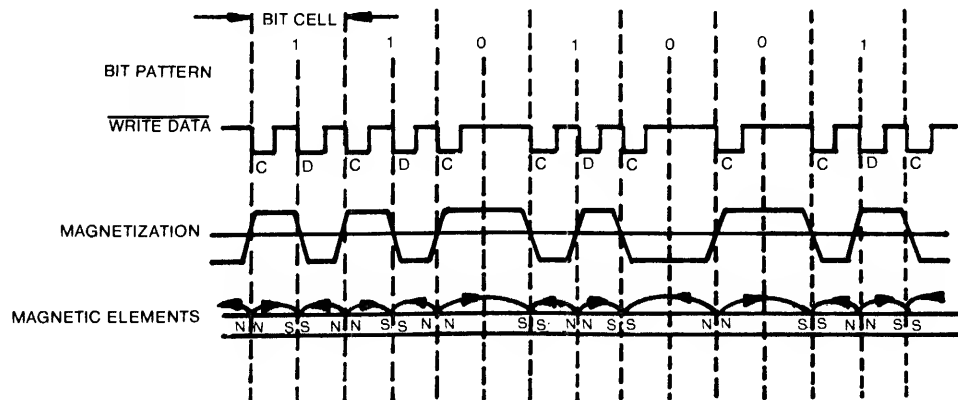
The control circuitry contains an interface control line. When the drive motor control interface line is false (high), the drive motor is allowed to come up to speed.

#### 2.2.4 Carriage Positioner Control

The head positioning system uses a bipolar-driven motor drive, which changes one phase for each track advancement of the read/write carriage. In addition to the logic necessary for motor control, a gate is provided that inhibits positioner motion during a write operation.

#### 2.2.5 Write/Erase Control

Information is recorded on the diskette by using a double-frequency code. Figure 2-2 illustrates the magnetization profiles in each bit cell for the number sequence shown for FM recording.



**Figure 2-2. FM Recording Magnetization Profiles**

All signals required to control the electronics are provided by the Interface Controller Card in the Concept. These control signals are:

- Select
- Write Gate
- Write Data
- Write Current

Composite Read Data is sent to the Controller via the interface.

The write electronics consist of a switchable write current source, a write waveform generator, an erase current source, the trim erase control logic, and the head selection logic.

The read/write winding on the head is centertapped. During a write operation, current from the write current source flows in alternate halves of the winding, under control of the write waveform generator.

The condition required for recording, i.e., Drive Ready, must be established by the Interface Controller as follows:

1. Drive speed stabilization occurs 500 milliseconds after the drive motor is started.
2. Subsequent to any read/write operation, the positioner must be allowed to settle. This requires 18 milliseconds maximum after the last step pulse is initiated, i.e., 3 milliseconds for the step motion and 15 milliseconds for settling.
3. The foregoing operations can be overlapped, if required.

Figure 2-3 illustrates the timing diagram for a write operation. At  $t=0$ , when the unit is ready, the write gate interface line goes true. This enables the write current source. Write current is switched via the write current switch interface line to a lower value by the Interface Controller at track 43.

The Trim Erase control goes true 190 microseconds after the Write Enable interface line since the trim erase gaps are behind the read/write gap. It should be noted that this value is optimized between the requirements at track 00 and at track 76, so that the effect of the trim erase gaps on previous data is minimized.

Figure 2-3 shows the information on the write data interface line and the output of the write waveform generator, which toggles on the leading edge of every write data pulse.

A maximum of 4 microseconds between the write gate going true and the first write data pulse is only required if faithful reproduction of the first write data transition is significant.

At the end of recording, at least one additional pulse on the write data line must be inserted after the last significant write data pulse to avoid excessive peak shift effects.

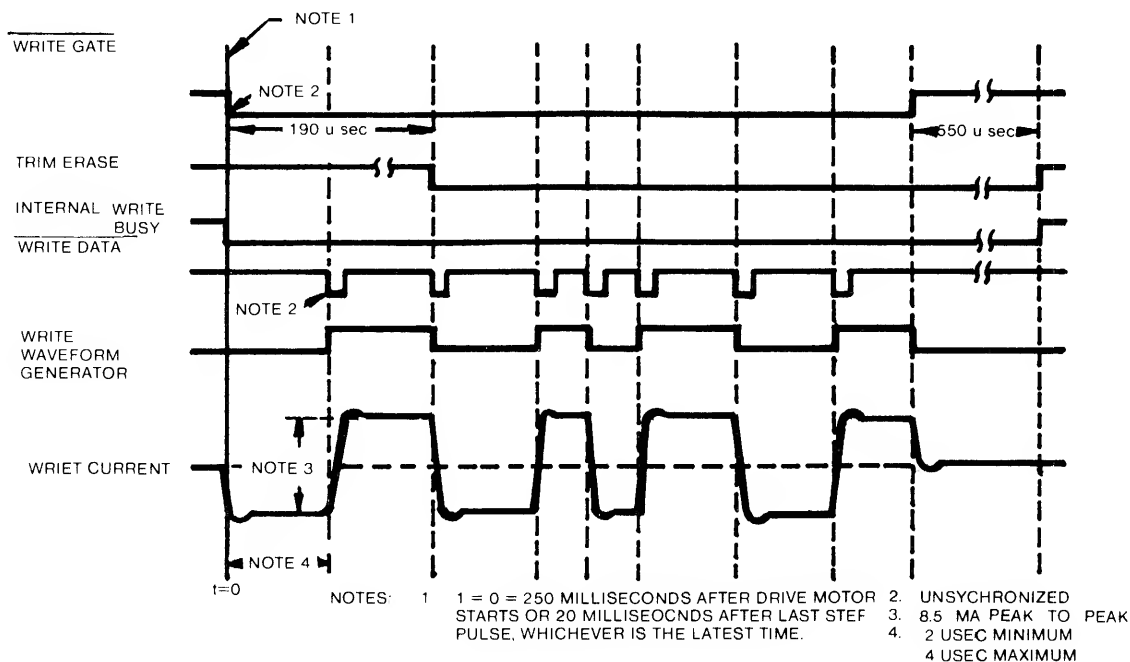


Figure 2-3. Write Operation Timing Diagram

The duration of a write operation is from the true going edge of write gate to the false going edge of erase. This is indicated by the internal write busy waveform shown (figure 2-3).

### 2.2.6 Read Amplifier and Digitizer

The Read electronics consist of:

- Read Switch
- Read Preamplifier
- Filter
- Differentiator
- Time Domain Filter and Digitizer

The read switch is used to isolate the read amplifier from the voltage excursion across the head during a write operation.

The drive must be in a ready condition before reading can begin. As with the data recording operation, this ready condition must be established by the Controller Interface.

The output signal from the read/write head is amplified by a read preamplifier and filtered by a low-pass linear phase filter to remove noise (see figure 2-4). The linear output from the filter is passed to the differentiator, which generates a waveform whose zero crossings correspond to the peaks of the Read signal. This signal is then fed to the zero crossing detector and digitizer.

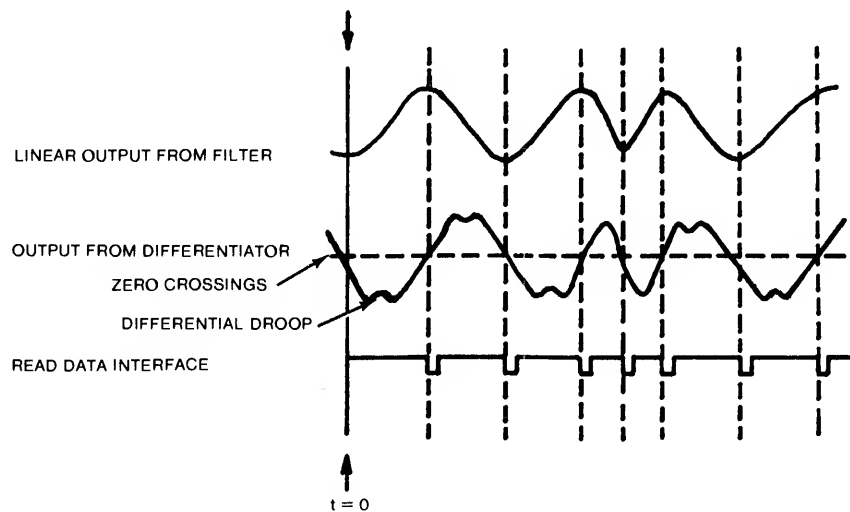


Figure 2-4. Read Timing Diagram

T=0 is defined as 250 milliseconds after the drive motor starts, or 20 milliseconds after a step command, or 100 microseconds after termination of write busy, whichever is the latest time.

The zero crossing detector and digitizer circuitry generates a 200 nanosecond read data pulse, corresponding to each peak of the read signal. The composite read data signal is sent to the user system via the Read Data interface line.

### 2.3 Concept Interface

The Corvus Concept Floppy interface is composed of a Controller Card and a 50-pin flat ribbon cable. The Tandon Floppy Drive is compatible with Industry Standard Controllers. The Standard Microsystems™ FDC1793 chip is the heart of the Controller Board. All drive output lines are TTL compatible open collector, which are terminated in the Controller Card. The Input Lines on the Controller are:

**DISK CHANGE:** Provides a low (true) signal if the drive goes Not Ready while deselected. Reselecting the drive while Ready will provide a high (false) signal.

**TWO SIDED:** Is used to determine two-sided diskettes. Not used for the TM848-01 Drive.

**READY:** Indicates that the diskette is rotating at 360 RPM.

**-TRACK 00:** Head is positioned at the outermost track.

**-INDEX:** Provides a pulse once each revolution of the diskette to indicate the logical beginning of a track.

**-WRITE PROTECT:** Indicates a write protected diskette is installed. This signal is a logical 0 when the diskette's write protect notch is not covered.

**-RAW READ DATA:** Normally high, it becomes low for the active state for 200 nanoseconds  $\pm$  50 for each flux change.

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The output lines (Controller to Drive):

**-MOTORON:** Used to turn on/off the spindle motor.

**DE0 and DE1:** Drive select lines.

**SIDE 0:** Selects side of diskette for Read/Write.

**STEP:** Move head in direction specified by DIRECTION IN.

**DIRECTION IN:** Specifies the direction of step; High=true.

**WRITE GATE:** Enables write current in the read/write head.

**WRITE DATA:** Enabled by write gate. Provides data to be written on the diskette. Disabled by WRITE PROTECT.

**CHAPTER 3**  
**DISASSEMBLY AND ASSEMBLY PROCEDURES**

## CHAPTER 3

### DISASSEMBLY and ASSEMBLY PROCEDURES

#### 3.0 Scope of Chapter

The purpose of this Chapter is to give detailed instructions for disassembling and removing sub-sections of the drive. The drive can be sectioned into the following modules:

- Covers, right and left side
- Power Supplies, +24 and +5 VDC
- Internal Power Harness
- Rear Connectors and Devices
- Drive Mechanism

Reassembly and Reinstallation of these parts is described as the reversal of the disassembly and removal instructions with specific notes that should be observed.

#### 3.1 Cover Disassembly and Assembly

1. POWER OFF THE DRIVE and remove the power cable and the 50-pin flat ribbon cable leading from the Controller Interface cable in the Concept Workstation.
2. Remove the two phillip screws at the rear of the drive which holds the right cover to the drive assembly. Lift the rear section of the right cover and remove it.
3. With drive mechanism exposed, remove the four phillips screws which mount the drive assembly to the left cover. You will have to disconnect the green ground wire and the violet and red AC wires leading from the power switch. Note the proper position of these wires on the power supply for reassembly.
4. Next, disconnect the internal flat cable leading from the back of the right cover to the edge connector on the circuit board of the drive. The drive assembly may now be removed from the right cover.

Reassembly of the covers onto the Drive Unit can be accomplished by reversing the disassembly instructions.

There may be some difficulty in replacing the left cover. This can be facilitated by positioning the front of the covers together with the left cover perpendicular to the right. Lowering the left cover into position keeping pressure on the front of the left cover to insure that the rear of the covers match into place (See Figure 3-1).

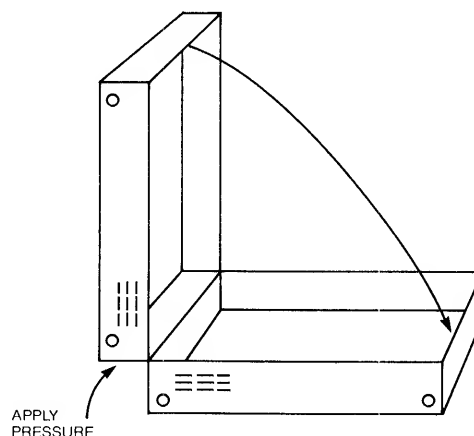


Figure 3-1. Cover Installation



### 3.2 Power Supply Removal

1. Disconnect the power connector leading from the power supplies to the rear of the drive unit by squeezing the connector release tabs together and pulling it away from the rear of the drive assembly (see figure 3-2).

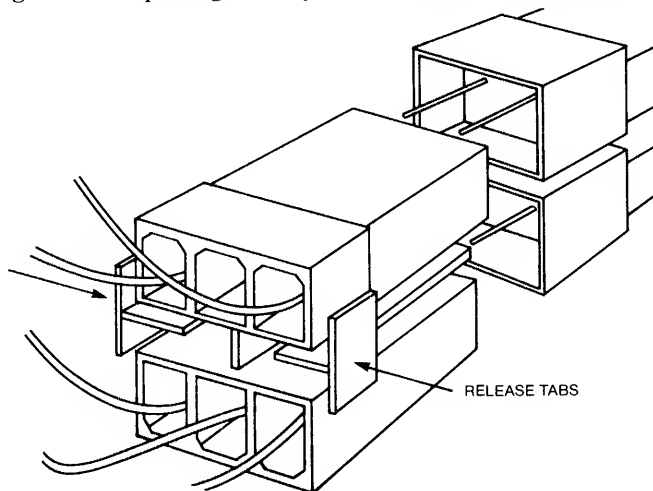


Figure 3-2. Drive Power Connector

2. Remove the sheet metal screws which fasten the power supply mounting to the drive metal casting.
3. The power supplies may now be removed. Note that the wire harness connects the two power supplies together. At this point you may wish to remove the power harness as described in the following section and remove the power supplies individually or you may remove them in tandem with the harness still attached.
4. 5 VDC power supply Model Number LUS-8-5 can be removed from the sheet metal power supply mount by removing the two mounting screws located on its side.
5. To remove the 24 VDC Model Number LUS-10-24 power supply, remove the three phillip screws attaching the power supply to the sheet metal mounting bracket.

To reassembly the power supplies onto the Diskette Drive unit, reverse the removal procedures. Assembly information can be found in the assembly drawings in Appendix D.

### 3.3 Power Harness Removal

There are two wire harnesses connected to the power supplies:

1. A two wire harness provides AC power to the supplies and is easily removed by pulling the fast-on from the rear of the power switch. The other end can be disconnected by removing the screws at the power supply.
2. The other harness supplies DC power to the circuit board on the drive unit. It is removed by disconnecting the connector at the rear of the drive (see figure 3-2). The other end can be disconnected by removing the phillip screws holding it to the power supply.

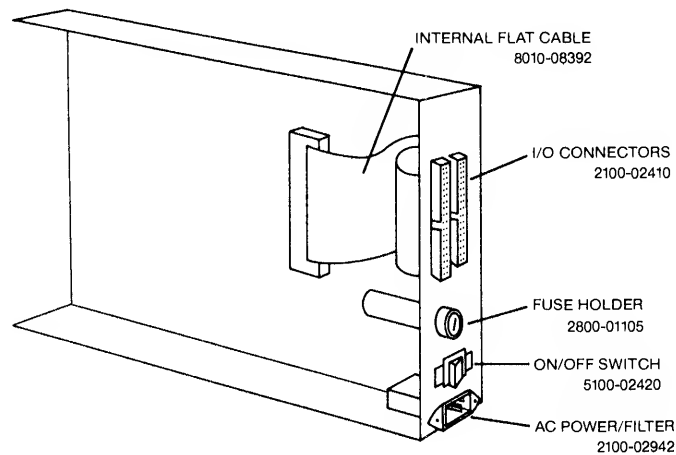
The reinstallation of the power harness can be performed by reversing the removal instruction. It is very important that the harness be installed correctly. Correct positioning of these connectors are shown in Appendix D.

#### CAUTION:

**Improper installation may result in severe damage to the Power Supplies and the Floppy Drive Assembly.**

### 3.4 Rear Connectors and Devices

The Receptor Power filter, the AC power switch, the fuse holder and the internal flat cable are all mounted at the rear of the left cover (figure 3-3).



**Figure 3-3. Left Cover**

Removal of these parts is as follows:

1. The Receptor Power Filter is connected to the power switch and the fuse holder via two lug terminals. Remove the fast-ons from the lugs on the wire ends. Next, remove the two retaining screws holding the connector to the rear of the cover. The Power Filter may now be pulled out from the rear of the cover.
2. Removal of the Power Switch is accomplished by pulling the fast-ons from the lug terminals at the rear of the switch. The switch is held in place by spring loaded retainers on the inside of the cover. These must be depressed on the top and bottom of the switch to allow the unit to be pulled through and out of the cover.
3. To remove the Fuse Holder, pull the fast-ons from the Power Filter and the power switch. Remove the plastic retainer nut on the inside of the cover. The Fuse Holder can be pulled through and out of the hole.
4. The internal flat cable connects the 50-pin interface cable to the drive electronics circuit board. Disconnect it from the board and remove the four mounting screws on the rear of the cover. Push the cable into the cover housing and lift it out.

To reinstall these connectors and devices, reverse the disassembly instructions taking care that all wiring is installed correctly. The wiring can be checked for correct positioning by the assembly drawing in Appendix D.

**CHAPTER 4**  
**CHECKS AND ADJUSTMENTS**

## CHAPTER 4

### CHECKS AND ADJUSTMENTS

#### 4.0 Scope of Chapter

This chapter contains checks and adjustments that can be made by trained technicians. Each particular measurement should be checked before making the adjustment. Perform the adjustment only if the results of the measurement is inaccurate.

Before applying power to the drive or doing any checks or adjustments, visually inspect the drive to ensure that it has no missing or broken parts.

#### 4.1 List of Tools

The following equipment is required to perform all the checks and adjustments in this chapter:

1. A dual-trace, wideband oscilloscope. Tektronix 465 or equivalent.
2. Concept Personal Workstation.
3. FDIAG diagnostic program (see Chapter 5).
4. Screwdrivers; phillips and flat blade.
5. A set of Allen wrenches.
6. A blank diskette.
7. Alignment diskette. Dysan P/N 240/2A or equivalent.
8. I.C. dip clip for 14 pin.
9. Digital Voltmeter

#### 4.2 Drive Adjustments

The checks and adjustments in this section should be done with a known-good Concept, Interface Controller, and Cable.

##### 4.2.1 Spindle Drive Motor

The motor speed specification is  $360 \text{ RPM} \pm 4.5 \text{ RPM}$ .

1. Verify the power supply voltages of  $+24 \text{ VDC} \pm 2.4 \text{ V}$   
 $+5 \text{ VDC} \pm 0.25 \text{ V}$
2. Insert a blank diskette into the drive.
3. Using FDIAG diagnostic, select Speedtst.
4. The speed should be 360 RPM as shown on the Concept's monitor.
5. Adjust R133 (see figure 4-1) on the drive circuit board until the RPM is 360 RPM. If observed on an oscilloscope the index pulses should be 166.67 milliseconds from leading edge to leading edge. The index pulse can be seen at the right side of resistor R33.
6. If the drive motor speed cannot be adjusted, recheck the power supply voltages. The mechanism must be replaced if the speed cannot be adjusted to within specification.

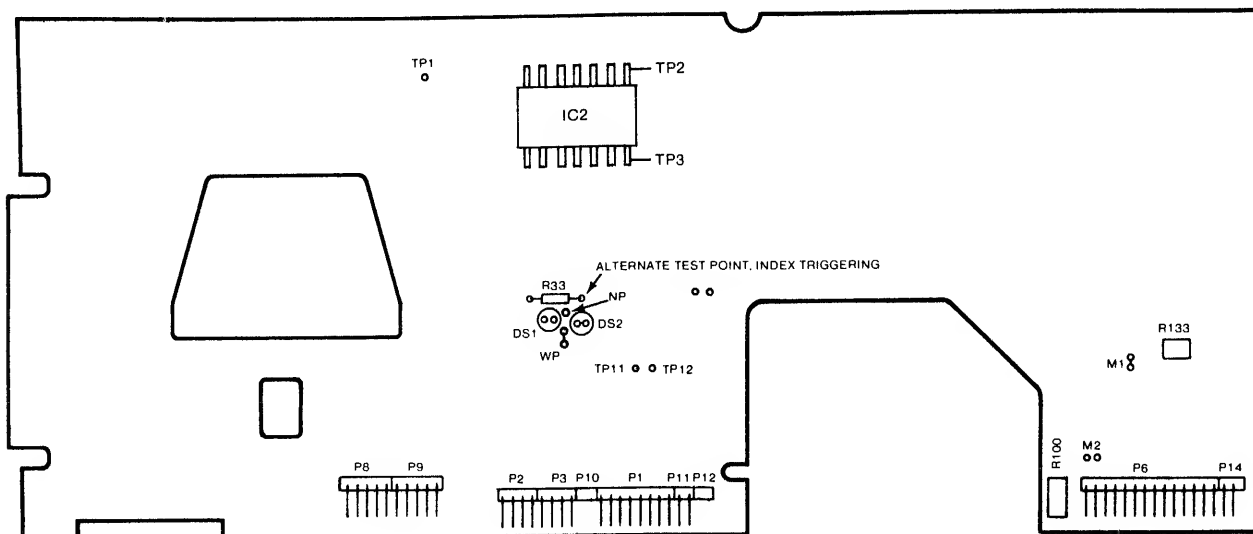


Figure 4-1. Circuit Board Assembly, Test Points

#### 4.2.2 Cats Eye Alignment

The Cats Eye (CE) alignment procedure positions the Read/Write Head at the proper radial distance from the hub center line, ensuring the accuracy of the track alignment (see figure 4-2). This procedure is necessary only after other servicing or if diskette interchange problems are suspected.

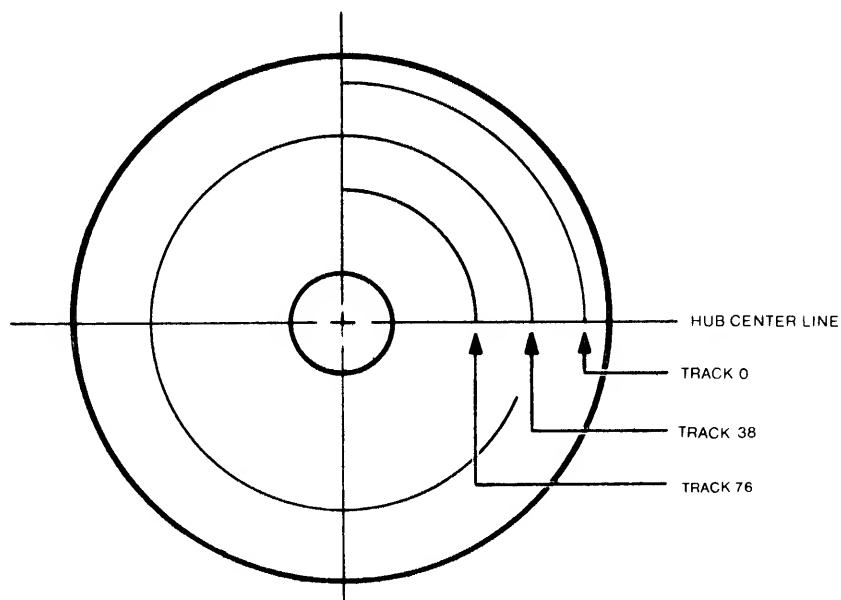


Figure 4-2. Hub Center Line and Track Locations

Follow these steps in sequence to check the alignment:

1. Set the Oscilloscope:  
Channel A: Test Point 2  
Channel B: Test Point 3  
Ground: Test Point 1  
Time Base: 20 msec per div  
Ext Trigger: Negative. Test point 11 or R33
2. Apply power to the drive.
3. Insert an Alignment diskette.
4. Using FDIAG, select HdRadial
5. Seek to track 38 for a Cats Eye and adjust scope to observe the pattern (see figure 4-3).

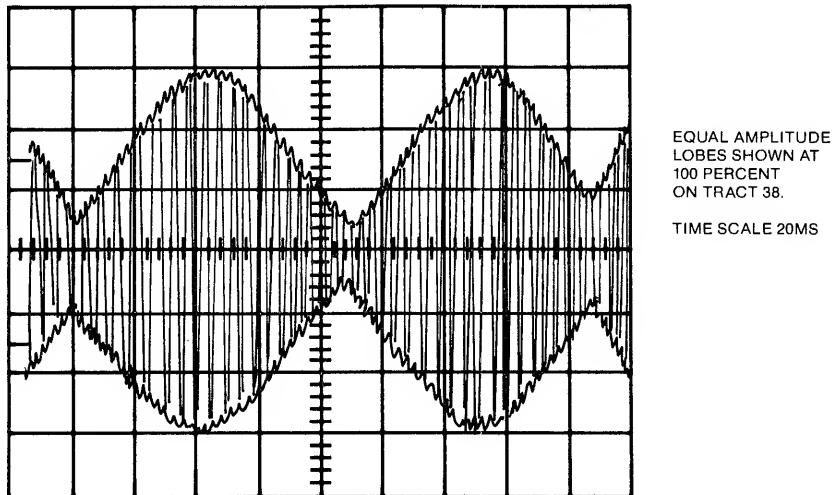


Figure 4-3. Cats Eye Pattern

6. Verify that the smaller of the two Cats Eye patterns is not less than 75 percent of amplitude of the other one.
7. Using FDIAG step to track 00, then step it back to 38.
8. Reverify the Cats Eye pattern.
9. Using FDIAG step to track 76, then step it back to 38.
10. Reverify the Cats Eye pattern.
11. If any of the checks listed above does not meet the conditions stated in step 6 the head carriage must be adjusted. See section 4.2.3 for instructions.

#### 4.2.3 Head Carriage Adjustment

While observing the Cats Eye pattern (section 4.2.2) follow these steps to adjust the carriage:

1. Loosen the 2 retaining screws that straddle the nylon adjustment cam located beneath the drive until the cam can be moved (see figure 4-4).

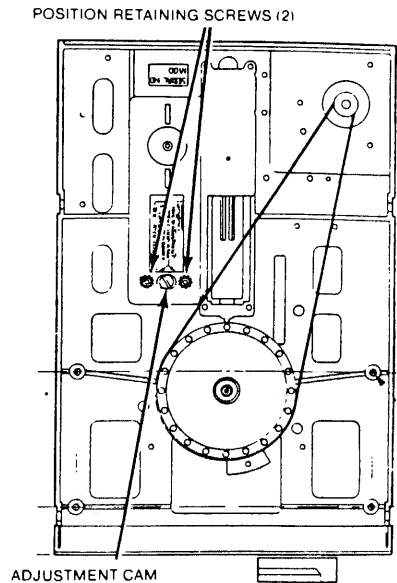


Figure 4-4. Head Module Retaining and Cam Screws

2. While observing the Cats Eye pattern, use a flat blade screw driver to turn the adjustment cam until one Cats Eye lobe is within 75 percent of the amplitude of the other.
3. Reverify the alignment (section 4.2.2).

#### 4.2.4 Index Sensor Checks and Adjustments

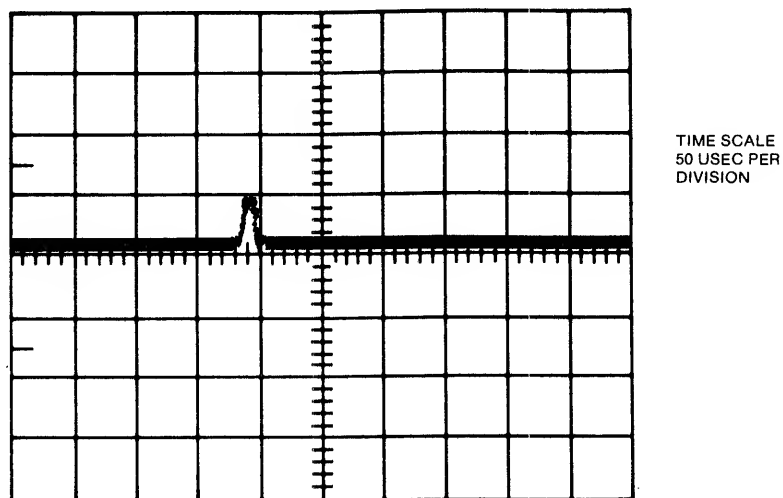
The index adjustment changes the time period from the index pulse to the start of the data. The adjustment should be checked after the drive has been aligned (section 4.2.2) or when diskette interchange errors are suspected.

##### 4.2.4.1 Index-to-Data Burst Check

Before this adjustment is performed the spindle speed must be within tolerance (section 4.2.1).

1. Set the oscilloscope:

|            |                              |
|------------|------------------------------|
| Channel A: | Test Point 2                 |
| Channel B: | Test Point 3                 |
| Time Base: | 50 microseconds per division |
| Trigger:   | Negative at R33              |
2. Power on the drive and insert the Alignment diskette.
3. Using FDIAG seek to track 1.
4. Ensure that the index-to-data burst occurs at  $200 \text{ microseconds} \pm 100 \text{ microseconds}$  from the leading edge of the index pulse (see figure 4-5).



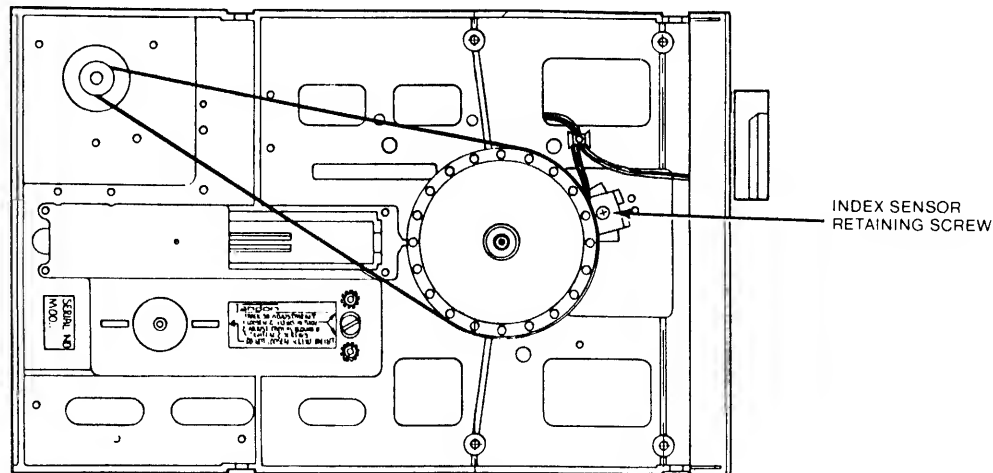
**Figure 4-5. Index-to-Data Burst**

5. If the index sensor is out of specification then perform the adjustment in the next section (4.2.4.2).
6. When the index measurements meet the specification then check the index-to-data burst on track 76.
7. If any index measurement does not meet the specification then the index sensor must be adjusted.

#### **4.2.4.2 Index Sensor Adjustment**

1. Loosen the index sensor's retaining screw located on the underside of the chassis (see figure 4-6).





**Figure 4-6. Index Sensor's Retaining Screw and Adjustment**

2. Adjust the index sensor with a flat blade screwdriver until the index-to-data burst occurs 200 microseconds  $\pm$  100 microseconds from the leading edge of the index pulse.
3. Tighten the index sensor's retaining screw.
4. Reverify the index-to-data burst (section 4.2.4.1)

#### **4.2.4.3 Index Pulse Width Check**

The index pulse width is non-adjustable. If the index pulse width is not within specifications, replace the drive mechanism.

1. Set the oscilloscope:

|            |                               |
|------------|-------------------------------|
| Channel A: | R33                           |
| Ground:    | Test Point 1                  |
| Time Base: | 0.5 milliseconds              |
| Vertical:  | 2 volts per div               |
| Trigger:   | Negative leading edge at R33. |
2. Power on the drive, load blank diskette.
3. Using FDIAG, run Speedtst
4. Ensure that the negative going pulse width is between 1.0 and 2.3 milliseconds (see figure 4-7).

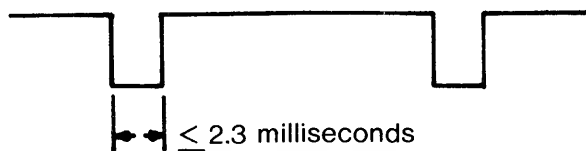


Figure 4-7. Negative Going Pulse Width

#### 4.2.5 Track 00 Sensor Check and Adjustment

The track 00 sensor identifies track 00 sending a signal to the logic electronics. A track 00 signal is sent to the controller on pin 20 of the interface.

1. Apply power to the drive.
2. Load an alignment diskette into the drive.
3. Using FDIAG step the carriage to track 38.
4. Confirm the position by observing the Cats Eye (see section 4.2.2).
5. Attach channel A to test point 10.
6. Using FDIAG, Track0, restore to track 00. Ensure that track 00 is detected.
7. Seek to track 1, and ensure that the signal at test point 10 is high.
8. Seek to track 2, and ensure that this line is low.
9. Seek to track 3, and ensure that this line is low.
10. If the signal is incorrect, restore to track 00.
11. Seek to track 2, and loosen the two retaining screws that hold the sensor (see figure 4-8).

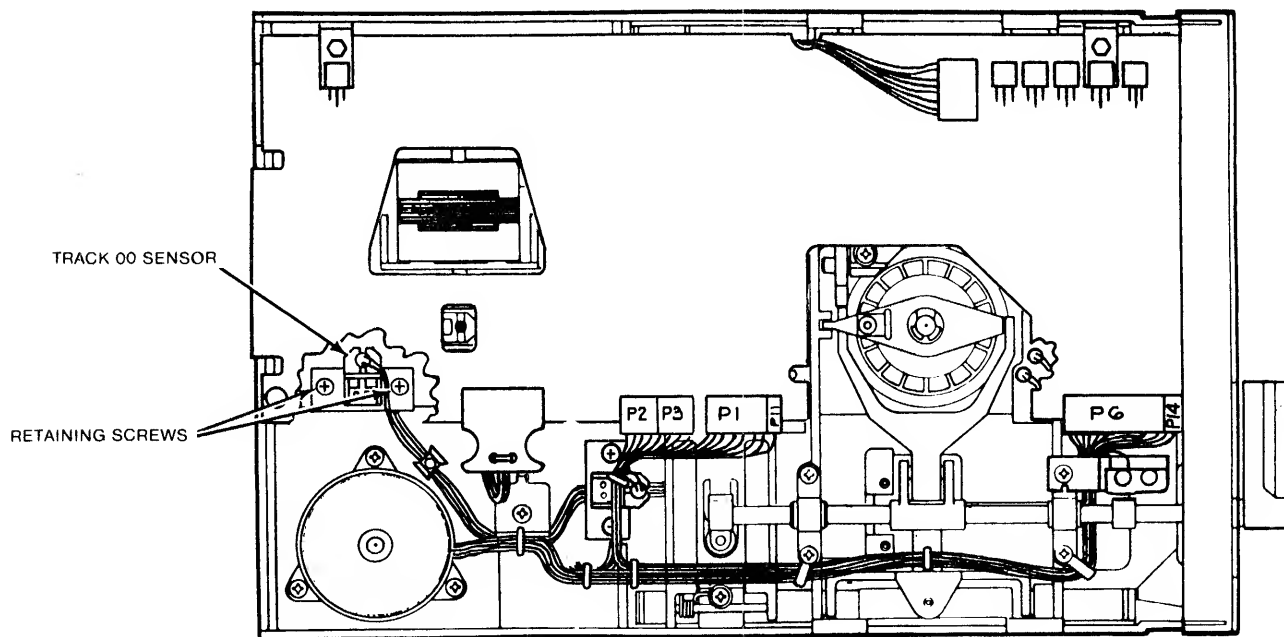


Figure 4-8. Track 00 Sensor Adjustment

12. Push the sensor toward the back of the drive. Slowly push it forward until the signal on the oscilloscope just goes low (true).
13. Tighten the retaining screws, and repeat steps 5 thru 9.

#### 4.2.6 Amplitude Check

The amplitude test checks the Read Amplifier output voltage.

1. Restore the head to track 00.
2. Insert a blank diskette and write a 2F, all ones pattern. FDIAG HeadAmpl will perform this function.
3. Set the oscilloscope:

|            |                                 |
|------------|---------------------------------|
| Channel A: | Test point 4                    |
| Channel B: | Test point 5                    |
| Vertical:  | 1 volt per div. (both channels) |
| Time base: | 50 milliseconds per division    |
| Trigger:   | Auto, sync A or B               |

Use AC coupling on both channels.  
Add A and B, B inverted.
4. The minimum amplitude displayed on the scope should be no less than 3 volts peak-to-peak at any point.
5. Reverify the measurement with another blank diskette.
6. If the amplitude is less than the specification, inspect the heads to ensure they are not contaminated. Use a cleaning diskette, if necessary.
7. If the amplitude is not within specifications the drive mechanism must be replaced.

#### 4.2.7 Azimuth Check

Azimuth is the angle of the heads with respect to the track at the point of the read/write gap. Azimuth is measured in minutes (one minute = 1/60 degree).

1. Set the oscilloscope:

|            |                              |
|------------|------------------------------|
| Channel A: | Test point 2                 |
| Channel B: | Test point 3                 |
| Ground:    | Test point 1                 |
| Vertical:  | 100 mv per div.              |
| Time base: | 1 millisecond or as required |
| Trigger:   | Leading edge at R33          |
2. Power on the drive and insert an Alignment diskette.
3. Using FDIAG step to track 76.
4. Observe the pattern in Figure 4-9. This depicts an optimum head alignment of zero minutes of azimuth error. This means that the head carriage is perpendicular to the track being read. Bursts 1 and 4 are of equal amplitude; bursts 2 and 3 are of equal amplitude.

Burst 1 should be less than or equal to burst 2. Burst 4 should be less than or equal to burst 3.

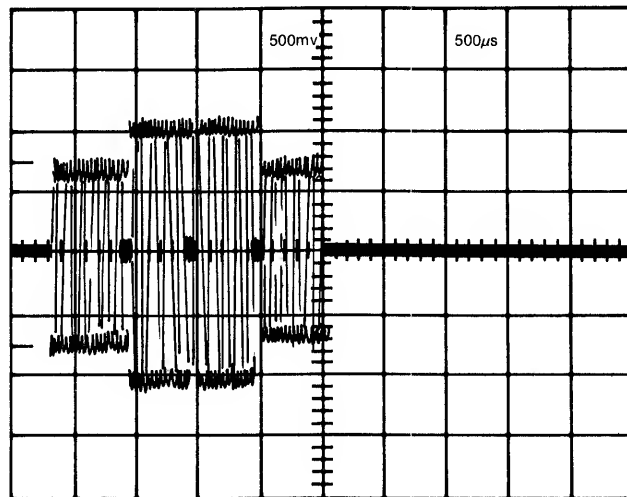


Figure 4-9. Optimum Head Azimuth Alignment

5. Figure 4-10 depicts an azimuth of exactly minus 9, 12, or 18 minutes, depending upon the manufacturer of the diskette. This is the lower limit of allowable error. Bursts 1 and 2 are of equal amplitude. If this signal is observed, the Cats Eye alignment should be checked.

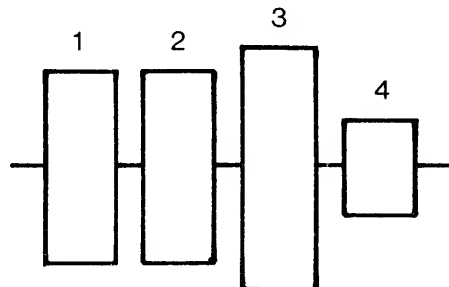


Figure 4-10. Head Azimuth Acceptable Lower Limit

6. Figure 4-11 depicts an alignment of exactly plus 9, 12, or 18 minutes, depending upon the manufacturer of the diskette. Bursts 3 and 4 are of equal amplitude. This is the upper limit of allowable error. If this signal is observed, the Cats Eye alignment should be checked.

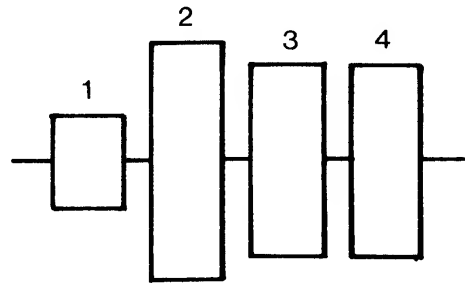


Figure 4-11. Head Azimuth Acceptable Upper Limits

7. The azimuth is not adjustable. If not within specification, the drive mechanism should be replaced.

#### 4.2.8 Load Arm Adjustment

This adjustment is made to ensure proper loading of the head when the diskette is engaged (see figure 4-12).

1. Insert a blank diskette into the drive.
2. Turn the diskette lever to load the disk and seek to track 00. There should be a space of  $1/16$  inch between the head load arm and the load plate.
3. Seek to track 76 and ensure that a space of  $1/16$  inch remains between the head load arm and the plate.
4. Adjust the Allen screw located behind the head load cam until there is a space of  $1/16$  inch (see figure 4-12).

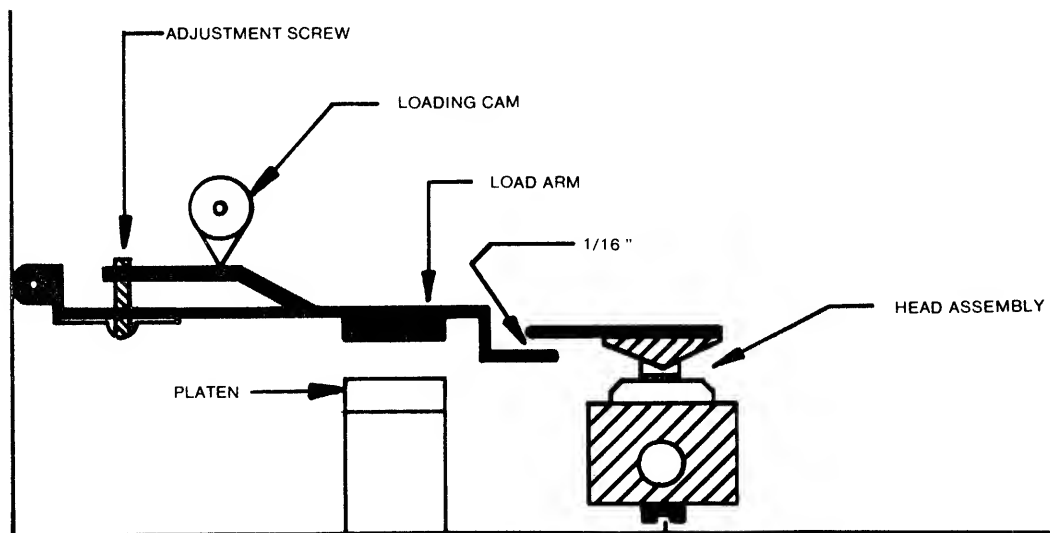


Figure 4-12. Load Arm Adjustment, Front View

#### 4.3 Interface Controller Checks and Adjustments

The following checks and adjustments should be made with a digital voltmeter, and a frequency counter or oscilloscope.

**4.3.1 Bias Voltage Adjustment**

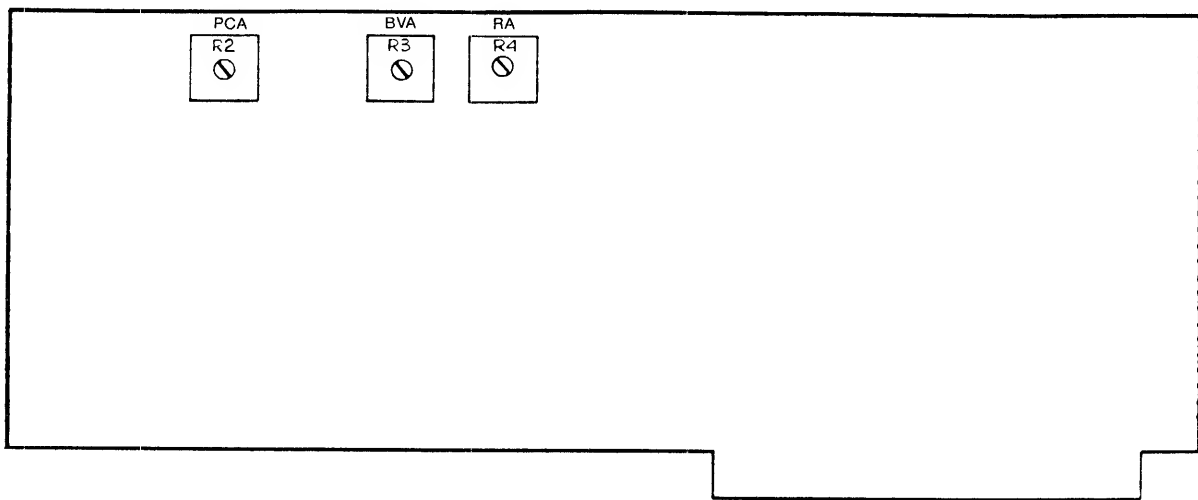
The bias circuitry is adjusted by connecting the positive lead of a digital voltmeter to test point 1, and the negative lead to a suitable ground (U1 pin 7). Apply power and adjust the bias voltage trimpot R3, labeled BVA, until a reading of 1.40 volts is obtained (see figure 4-13).

**4.3.2 Range Adjustment**

The range adjustment is accomplished by connecting the input lead of a frequency counter or oscilloscope to test point 2 and negative lead or ground lead to ground (U1-7). Apply power to the card and adjust R4, labeled RA, until a frequency of 4.00 MHz is obtained (see figure 4-13 for locations).

**4.3.3 Precomp Adjustment**

The precompensation circuitry is used for double density only and should not require any adjustment for this drive.



**Figure 4-13. Interface Controller Card  
Single-Sided, Single-Density**

#### 4.4 Power Supply Adjustments

The two power supplies mounted on the drive chassis provide +5 volts DC and +24 volts DC. Each voltage must be adjusted to within 0.1 volts with a digital voltmeter (see figure 4-14).

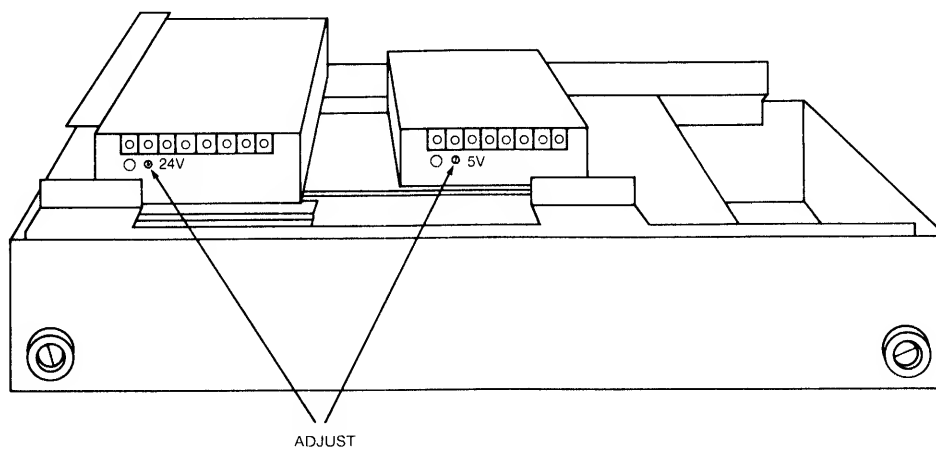


Figure 4-14. Power Supply Adjustments

**CHAPTER 5**  
**TROUBLESHOOTING**

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## CHAPTER 5

### TROUBLESHOOTING

#### 5.0 Scope of Chapter

This Chapter will cover the diagnostic program FDIAG which is used while troubleshooting and making adjustments. Most repairs are limited to making an adjustment or replacing a major part of the Floppy Drive subsystem. This chapter will guide you toward choosing the proper course of action. A Troubleshooting Guide is included at the end of this chapter which will refer you to sections in this manual.

The tools you will need for troubleshooting are:

- FDIAG - Diagnostic Program on Hard Disk
- Digital Voltage Meter
- Diskette Drive Spares Kit
- Phillips Screw Driver
- Small flat Blade Screwdriver - For Voltage adjustments.

#### 5.1 Diagnostics

Corvus Systems has developed the diagnostic program FDIAG to enable the trained service technician to test and align the Tandon Floppy Drive. FDIAG can be found in the volume CCUTIL and the user must have access to this volume or have it copied to a volume to which he does have access.

##### 5.1.1 Operation

To run the diagnostic program FDIAG, it must be loaded from the hard disk. This can be done by setting the volume to CCUTIL. From the dispatch level, type in 'CCUTIL' and press the softkey F4 (SetVol). Now that the volume is set, you may run the diagnostic program by typing 'FDIAG' and pressing <RETURN>. The screen will display the following information:

---

FLOPPY DIAG (1.0): Corvus Concept Floppy Diagnostics  
(c) Copyright 1982 Corvus Systems

---



---

FDIAG [1.5] COMMAND:

---

|        |        |          |         |        |         |          |        |      |      |
|--------|--------|----------|---------|--------|---------|----------|--------|------|------|
| F1     | F2     | F3       | F4      | F5     | F6      | F7       | F8     | F9   | F10  |
| Rezero | SeekIn | LoopSeek | SeekTrk | StepIn | StepOut | Speedtst | Track0 | Help | Exit |

---

With the COMMAND key depressed, the softkey functions will change to:

|          |          |           |          |         |         |         |          |    |
|----------|----------|-----------|----------|---------|---------|---------|----------|----|
| F1       | F2       | F3        | F4       | F5      | F6      | F7      | F8       | F9 |
| IndexAdj | HdRadial | Head Ampl | HeadAzim | LoadArm | R/WTest | DiskChk | StepRate | Al |

---

##### 5.1.2 Test Descriptions

The individual diagnostic functions are defined below and their appropriate applications are discussed in Chapter 4 and sections 5.3 and 5.4.

- Rezero - rezero the floppy head.
  - SeekIn - move the head to the innermost track.
  - LoopSeek - continuous seek between any 2 tracks.
  - SeekTrk - seek to a specific track.
  - StepIn - move the heads in one track.
-

- StepOut - move the heads out one track.
- Speedtst - verify the RPM of hub motor.
- Track0 - used to adjust the track 0 switch.
- Help - request the help program.
- Exit - leave the diagnostic program.
- IndexAdj - used to adjust the index detectors.
- HdRadial - used to adjust head radial alignment.
- HeadAmpl - used to measure the head amplitude.
- HeadAzim - Used to adjust the head azimuth alignment.
- LoadArm - used to adjust the load arm.
- R/WTest - read/write test (DESTRUCTIVE to data).
- DiskChk - non-destructive read-only test.
- StepRate - set the head step rate (default=20ms).
- AltSlot - perform tests with alternate Concept slot (default = slot 3).

## 5.2 System Level Troubleshooting

The Corvus Concept interacts with all peripherals attached and performs a check of these peripherals during power up. A Systems Test 6 failure indicates one or more devices connected to the I/O slots is not ready for communication with the Concept. If the Floppy drive is suspected to be at fault, a modular replacement of subsections will be necessary in order to pinpoint the defective device.

### CAUTION:

**Always power off the Concept and Floppy Drive before removing or replacing any circuit boards.**

If communication with the Floppy cannot be established, or read/write problems exist, the following subsections may be at fault:

- Interface Controller and Cabling
- Floppy Drive or diskette
- Concept Workstation

One common problem that occurs when first setting-up a system is improper installation. Using the Floppy Drive Installation Guide, recheck the installation of the Interface Controller Card, cabling, and boot switches.

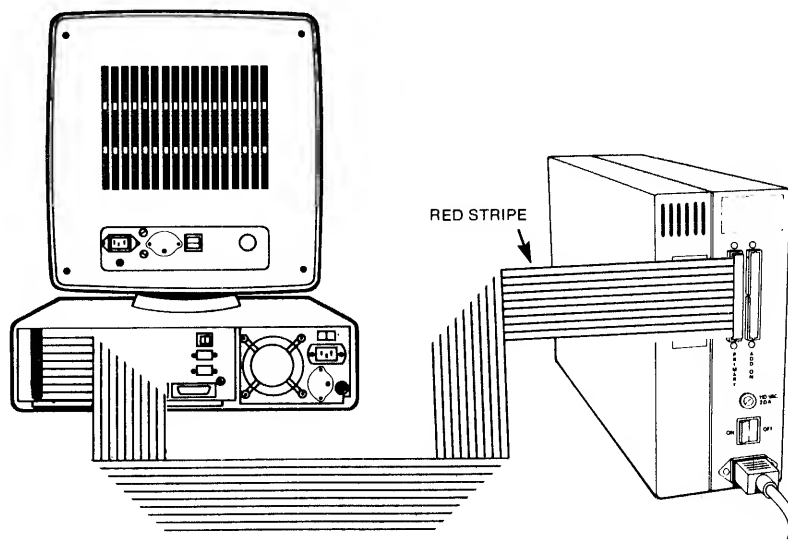


Figure 5-1. Floppy Drive Installation

Once confident that installation is correct, modular substitution is necessary to determine the defective section.

### 5.2.1 Interface Controller and Cable

Check for proper installation of the Interface Controller Card in slot three of the Concept (see figure 5.2).

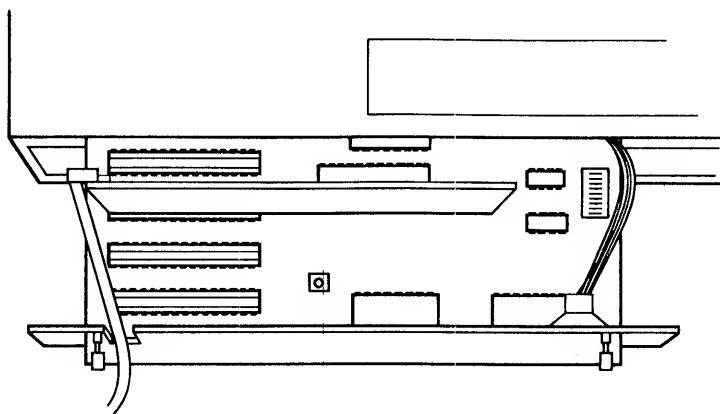


Figure 5-2. Interface Controller Installation

Replace the Interface Card and Cable with a known good set. Execute the R/WTest option in FDIAG. If no errors are encountered and the Floppy Drive is now operational, the card or the cable is defective. Section 5.4 of deals with troubleshooting the Interface Controller card.

### 5.2.2 Floppy Drive

If the Floppy Drive still does not operate properly, substitute the drive with a known good one and check the operation by running 'DiskChk' in the FDIAG program. If all checks out well, the Floppy Drive is defective. Go to Floppy Drive Troubleshooting in section 5.3.

### 5.2.3 Concept Workstation

If the problem still persists, the Concept Workstation should be examined. Refer to the Concept Service Manual for troubleshooting procedures.

## 5.3 Floppy Drive Troubleshooting

After isolating the defective system to the drive further troubleshooting will be necessary to determine which subsection of the drive is defective. The drive may be divided into modular subsections:

- Power Supply
- Drive Unit
- Power Harness

### 5.3.1 Power Supply

The two power supplies in the drive are manufactured by Lambda Corporation™. See Appendix D for assembly drawings.

- LUS-10-24 - Provides +24 VDC to the drive motor.
- LUS-8-5 - Provides +5 VDC to the drive circuit board.

™Lambda is a trademark of Nemic-Lambda Corporation

Input voltage may be 120 VAC or 240 VAC. These input voltages must be specified when ordering replacement power supplies.

1. Following the procedures in Chapter 3 of this manual, remove the cover. Be sure all internal cables are installed.
2. Power on the drive. Using a DVM, check the voltage levels for +24 VDC and +5 VDC (see section 4.4).
3. If any of the voltages are not within the tolerance of  $\pm .1$  volts DC, readjust the voltages.
4. If either of the voltages cannot be adjusted to within tolerance, check for correct AC voltage input. If the voltage settings are good, check the DC power harness for continuity.
5. If AC voltage is not present, disconnect the power cable and check the internal AC wire harness for continuity to the AC Receptor Power Filter.
6. If AC voltage is present at the input to the power supply and no DC is present at the output, then the power supply must be replaced. See section 3.2 for power supply replacement procedures.

### 5.3.2 Drive Unit

The drive unit is made up of the electronic circuit board and the drive mechanism. These are considered one module and can be ordered as a unit from Corvus.

If the power supply voltages check out good and the wire harness is also good, the following steps should be taken:

1. Perform the checks and adjustments (chapter 4):
  - Spindle Drive Motor Speed Adjustment
  - Cats Eye Alignment
  - Head Carriage Adjustment
  - Index Adjustments
  - Track Zero Sensor Alignment
  - Amplitude Check
  - Azimuth Check
  - Load Arm Adjustment
2. If the adjustments are made and the problem still exists, check the Interface Controller (see section 5.4).
3. If the steps above did not remedy the problem, the drive mechanism should be replaced (see chapter 3).
4. With the new drive unit installed, check and realign the drive as described in steps 1 and 2 above.
5. Check and exercise the drive using FDIAG, R/WTest to insure proper functioning and that the replaced components are in good working order.

### 5.3.3 Power Harness

The power harness can be checked for continuity with a DVM and should be replaced if found defective.

### 5.4 Interface Controller Card

The Interface Controller is designed and manufactured by Corvus Systems. There are three adjustments that can be made to the board. See section 4.3 for the procedures.

- Bias Voltage Adjustment
- Range Adjustment
- Precomp Adjustment

If all other modules have been checked and aligned as described in section 5.3.2, and the drive still does not function properly, perform the following steps:

1. Using a pencil eraser, clean the edge connector of the board and reinsert into the I/O slot. Check for proper orientation of the card and cable.
2. Perform the Interface Controller adjustments as described in section 4.3.

3. If the Controller Interface board is still not operating correctly, the board should be replaced. When a new Controller Interface Board is received from Corvus there should not be any need for adjustments. If the board does not perform to standards, the Controller Interface Adjustments should be attempted.

### 5.5 Troubleshooting Guide

| SYMPTOM                         | PROBABLE CAUSE                           | REMEDY  |
|---------------------------------|--|---|
| NOT READY<br>AND/OR<br>NO INDEX | Diskette not inserted.                   | Insert diskette   |
|                                 | Diskette not clamped.                    | Check loading procedure (1.2)                                   |
|                                 | Unit not selected.                       | Verify unit select and jumper configurations                    |
|                                 | Drive motor not turning.                 | Verify signal MOTORON   |
| SYSTEM 6 FAILURE                | Peripheral not on line.                  | Remove all peripherals except Floppy, reboot                    |
|                                 | Improper Installation.                   | Perform systems level troubleshooting (5.2)                     |
|                                 | Defective Drive.                         | Check Controller, Interface, Power cables<br>Troubleshoot (5.3) |
| DRIVE MOTOR<br>NOT TURNING      | +24 VDC not present.                     | Check +24V (5.3.1)  |
|                                 | Loose connector.                         | Check connector P6 on drive circuit board.                      |
| WILL NOT SEEK<br>OR RESTORE     | Interface Card.                          | Adjust (4.3). Replace card.                                     |
|                                 | Power Supply.                            | Check voltage (4.4). Replace defective power supply             |
|                                 | Stepper Motor disconnected.              | Check connections at P4 and P5.                                 |
|                                 | Spindle Motor speed bad.                 | Adjust (4.2.1)  |
|                                 | Index out of adjustment.                 | Adjust (4.2.4)  |
| Track 00 out of adjustment.     | Adjust (4.2.5)                           |   |
| WILL NOT WRITE                  | Incorrect installation.                  | Check per Installation Guide.                                   |
|                                 | Diskette Write protected.                | Place write enable tab on diskette.                             |
|                                 | Interface Card not functioning properly. | Adjust (4.3). Troubleshoot (5.4)                                |
|                                 | Bad diskette.                            | Replace diskette  |
|                                 | Bad Interface cable.                     | Replace cable   |
|                                 | Defective Drive                          | Replace mechanism   |
|                                 | Defective Power Supply                   | Check voltage (4.4). Replace supply.                            |
|                                 | Track 00 Sensor out of adjustment.       | Adjust (4.2.5)  |
|                                 | Load Arm defective.                      | Adjust (4.2.8). Replace mechanism.                              |

| PROBLEM       | PROBABLE CAUSE                        | REMEDY                                      |
|---------------|---------------------------------------|---|
| WILL NOT READ | Bad diskette.                         | Replace with known good diskette.           |
|               | Defective Interface Controller Card.  | Adjust (4.3). Replace with known good card. |
|               | Read/Write Head misalignment.         | Align Heads (4.2.2)                         |
|               | Amplitude too low.                    | Replace diskette. Replace mechanism.        |
|               | Defective Controller Cable.           | Replace cable                               |
|               | Index incorrect.                      | Adjust (4.2.4)                              |
|               | Spindle Motor speed out of tolerance. | Adjust (4.2.1)                              |
|               | Track 00 misadjusted.                 | Adjust (4.2.5)                              |
|               | Power Supply voltage.                 | Adjust (4.4)                                |
|               | Head Azimuth misaligned.              | Check (4.2.7). Replace mechanism.           |
|               | Load Arm defective.                   | Adjust (4.2.8). Replace mechanism.          |

**APPENDIX A**  
**GLOSSARY OF TERMS AND ABBREVIATIONS**

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## APPENDIX A

### GLOSSARY of TERMS and ABBREVIATIONS

**BIT:** BInary digiT

**BPI:** Bits-Per-Inch.

**BYTE:** A quantity of data bits, normally eight.

**CRC:** Cyclic Redundancy Check. An error checking technique that uses a mathematical algorithm.

**CYLINDER:** Two tracks on opposite sides of the diskette which have the same radial alignment.

**FM:** Frequency Modulation.

**MFМ:** Modified Frequency Modulation.

**MTBF:** Mean Time Between Failures.

**MTTR:** Mean Time To Repair.

**READ/WRITE HEAD:** A small electromagnet used for reading, recording, or erasing polarized spots (bits) which represent the data.

**SECTOR:** A segment of a track which contains 128, 256, or 512 bytes of data. The number of sectors per track and the size is determined by the number of index holes (Hard-sectoring) or by the computer's Operating System.

**SOFT SECTOR:** A sector which has it's size determined by the host computer's Operating System.

**TRACK:** The concentric ring of serial bits written on the diskette. Typically there are 77 tracks per side on an eight-inch floppy diskette. Each track is further divided into sectors.

**TUNNEL ERASE or STRADLE ERASE:** A method of trimming the tracks on diskettes. It increases the distance between tracks and decreases the possibility of crosstalk between tracks.

**WET BULB TEMPERATURE:** Operational Specification which states the limits of temperature and high humidity.



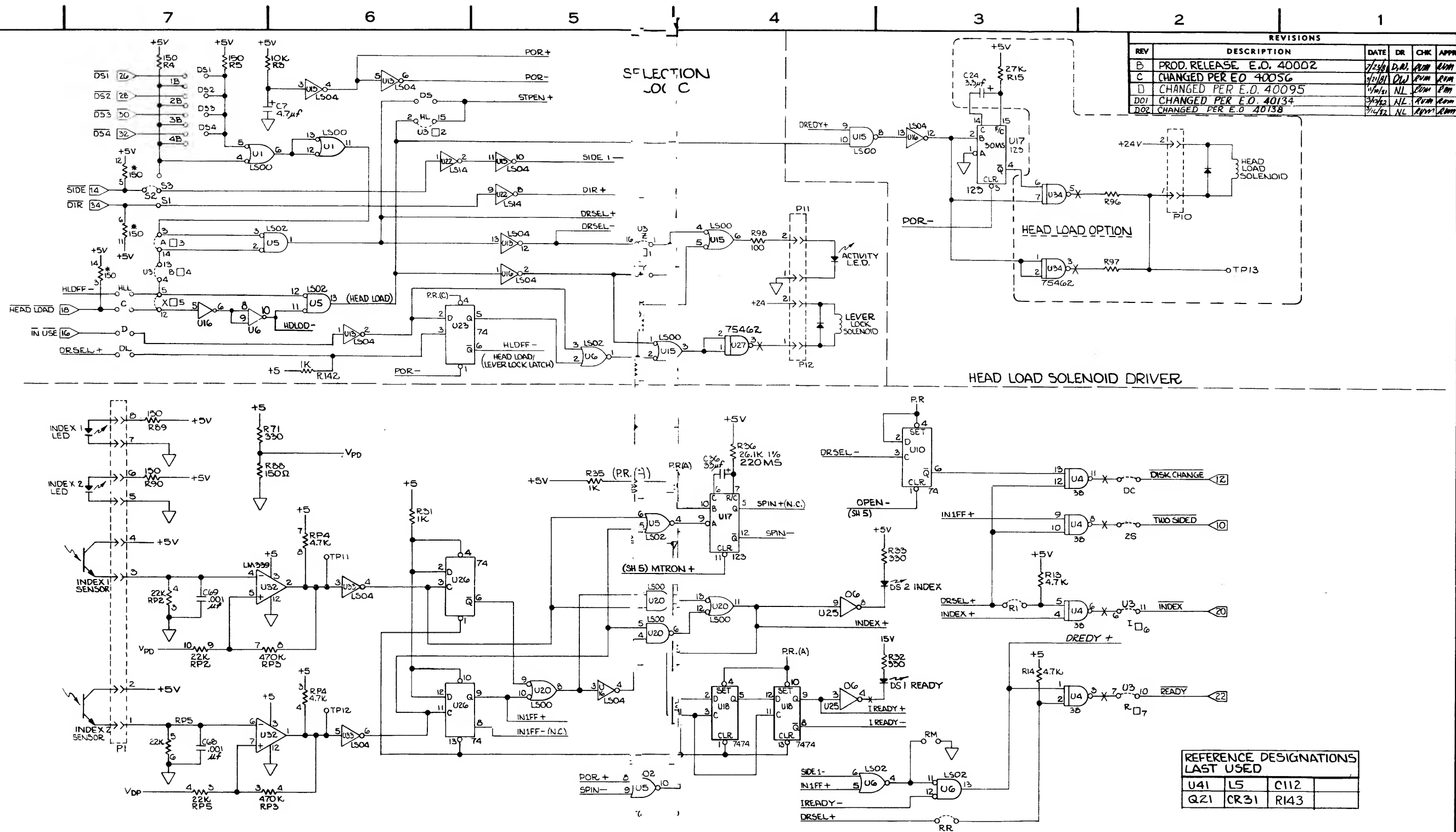
**APPENDIX B**  
**FLOPPY DISK DRIVE PART NUMBERS**

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## APPENDIX B FLOPPY DISK DRIVE PART NUMBERS

| Description         | Part Number |
|---------------------|-------------|
| Drive Mechanism     | 2200-02948  |
| Power Supply        | 8010-08735  |
| DC Harness          | 8010-08391  |
| Internal Flat Cable | 8010-08392  |
| External Flat Cable | 8010-08389  |
| Controller PCA      | 8010-08357  |
| AC Power Cord       | 6010-01447  |
| Right Cover         | 2400-02425  |
| Left Cover Assembly | 8010-08731  |

**APPENDIX C**  
**SCHEMATIC DIAGRAMS**



| REVISIONS |                          |         |     |     |
|-----------|--------------------------|---------|-----|-----|
| REV       | DESCRIPTION              | DATE    | DR  | CHK |
| B         | PROD. RELEASE E.O. 40002 | 7/23/81 | DAL | RM  |
| C         | CHANGED PER E.O. 40056   | 7/23/81 | DAL | RM  |
| D         | CHANGED PER E.O. 40095   | 7/23/81 | NL  | RM  |
| D01       | CHANGED PER E.O. 40134   | 7/23/81 | NL  | RM  |
| D02       | CHANGED PER E.O. 40138   | 7/23/81 | NL  | RM  |

| REFERENCE DESIGNATIONS<br>LAST USED |      |      |  |
|-------------------------------------|------|------|--|
| U41                                 | L5   | C112 |  |
| Q21                                 | CR31 | R143 |  |

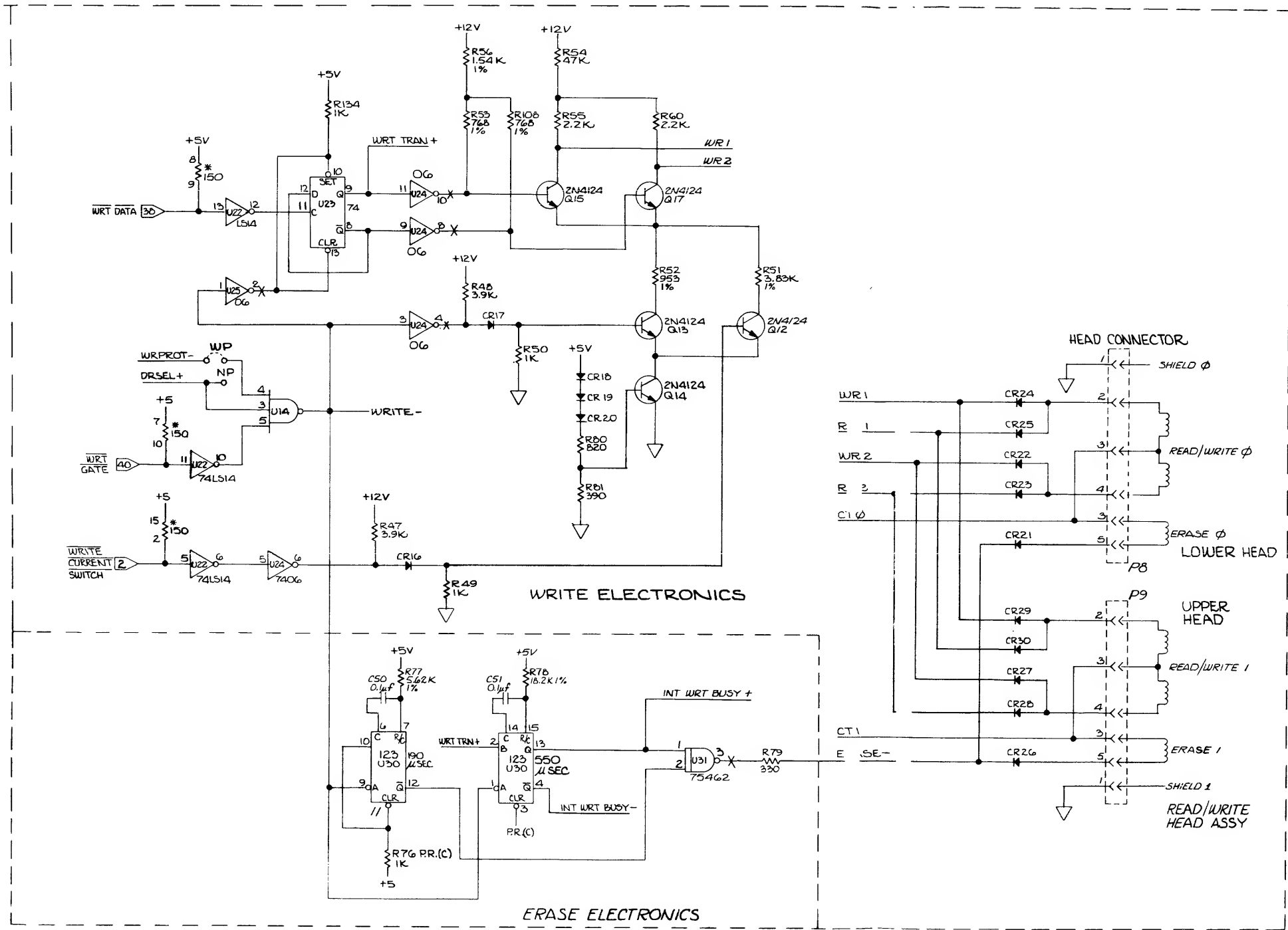
|                                  |                     |
|----------------------------------|---------------------|
| APPLICABLE P.C. BOARD REV. LEVEL | 210060-000 REV. D-E |
| APPLICABLE ASSY REV. LEVEL       | 210094-000 REV. G-J |

8. ALL CAPACITORS ARE IN MICROFARADS 50V.  
 7. ALL INDUCTORS ARE MICROHENRY'S  $\pm 10\%$ .  
 6. ALL RESISTORS ARE IN OHMS  $\frac{1}{4}W, \pm 5\%$ .  
 5.  $\infty$  - STRAP OPTION.  
 4.  $\square$  - STRAP OPTION LOCATED IN SHUNT U3.  
 3. \* - RESISTOR LOCATED IN RESISTOR PACK RP1.  
 2.  $\square$  - ON P13 UNLESS OTHERWISE SPECIFIED.  
 1.  $\square$  - STRAP PRE ETCH ON CIRCUIT BOARD.

NOTES: UNLESS OTHERWISE SPECIFIED

|                          |  |                                |  |
|--------------------------|--|--------------------------------|--|
| SIGNATURES               |  | DATE                           | <b>Tandon</b><br>CORPORATION<br><br><b>MODEL 848</b><br>DISKETTE DRIVE<br>ELECTRONICS. |
| DR. DANIEL WILSHIRE      |  | 7/23/81                        |  |
| CHK. RM                  |  |                                |  |
| ENGR. RM                 |  |                                |  |
| PROJ. ENGR. RM           |  | 7/23/81                        |  |
| TITLE                    |  |                                |  |
| DIMENSIONS ARE IN INCHES |  |                                |  |
| TOLERANCES:              |  |                                |  |
| XX $\pm .01$             |  |                                |  |
| XXX $\pm .005$           |  |                                |  |
| X $\pm .001$             |  |                                |  |
| X $\pm .0005$            |  |                                |  |
| BREAK ALL SHARP CORNERS  |  |                                |  |
| APPROX. .010             |  |                                |  |
| FINISH:                  |  |                                |  |
| NEXT ASSY                |  |                                |  |
| FIRST USE                |  |                                |  |
| APPLICATION              |  |                                |  |
| MATERIAL:                |  |                                |  |
| SIZE                     |  | CODE IDENT. NO.                | REV  |
| 210092-000               |  | D02                            |  |
| SCALE                    |  | DO NOT SCALE DWG. SHEET 1 OF 5 |  |

| REVISIONS |             |      |    |     |     |
|-----------|-------------|------|----|-----|-----|
| REV       | DESCRIPTION | DATE | DR | CHK | APP |
| E         | SEE SH 1    |      |    |     |     |



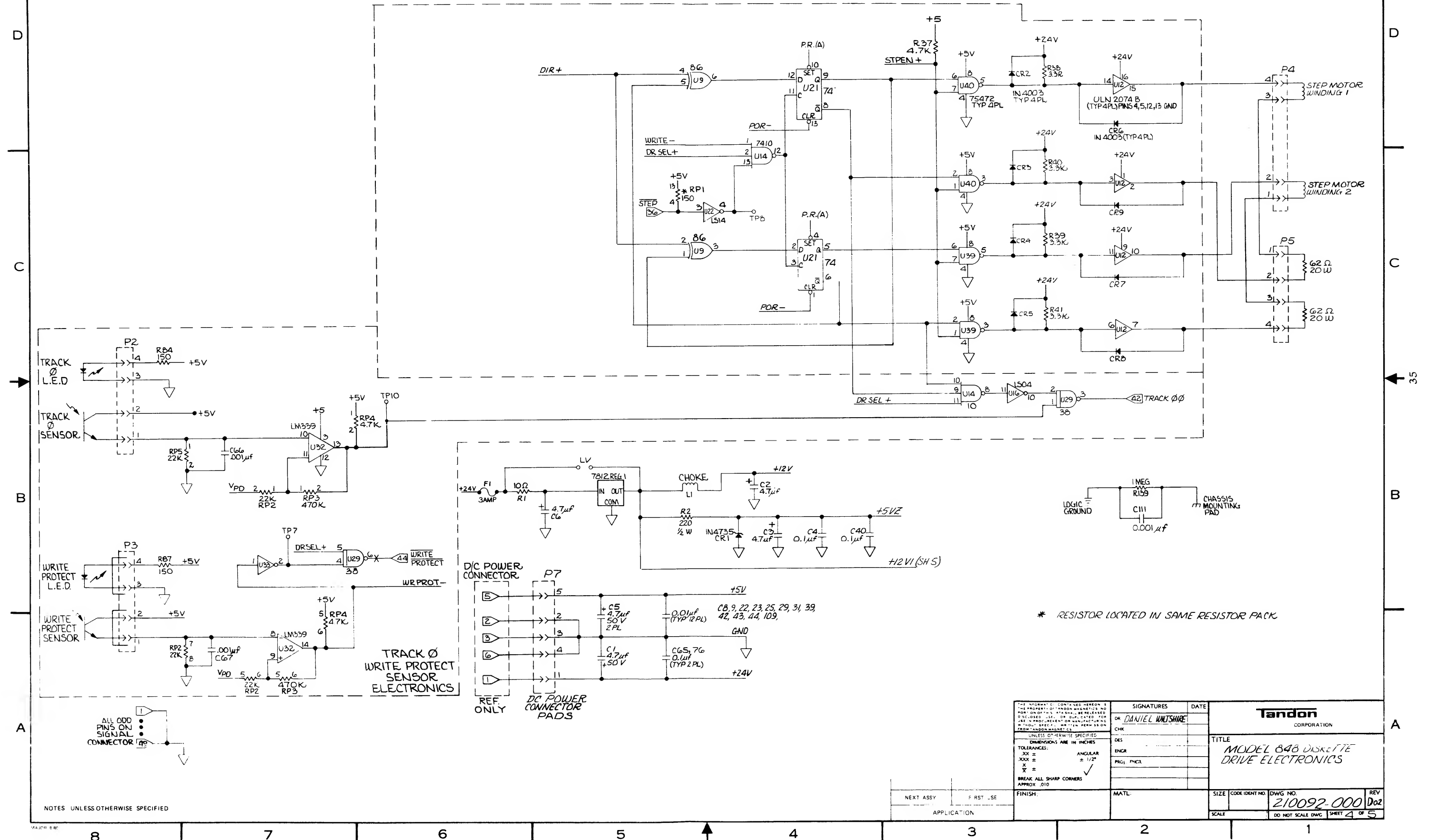
1. \* - RESISTOR LOCATED IN RESISTOR PACK RP1

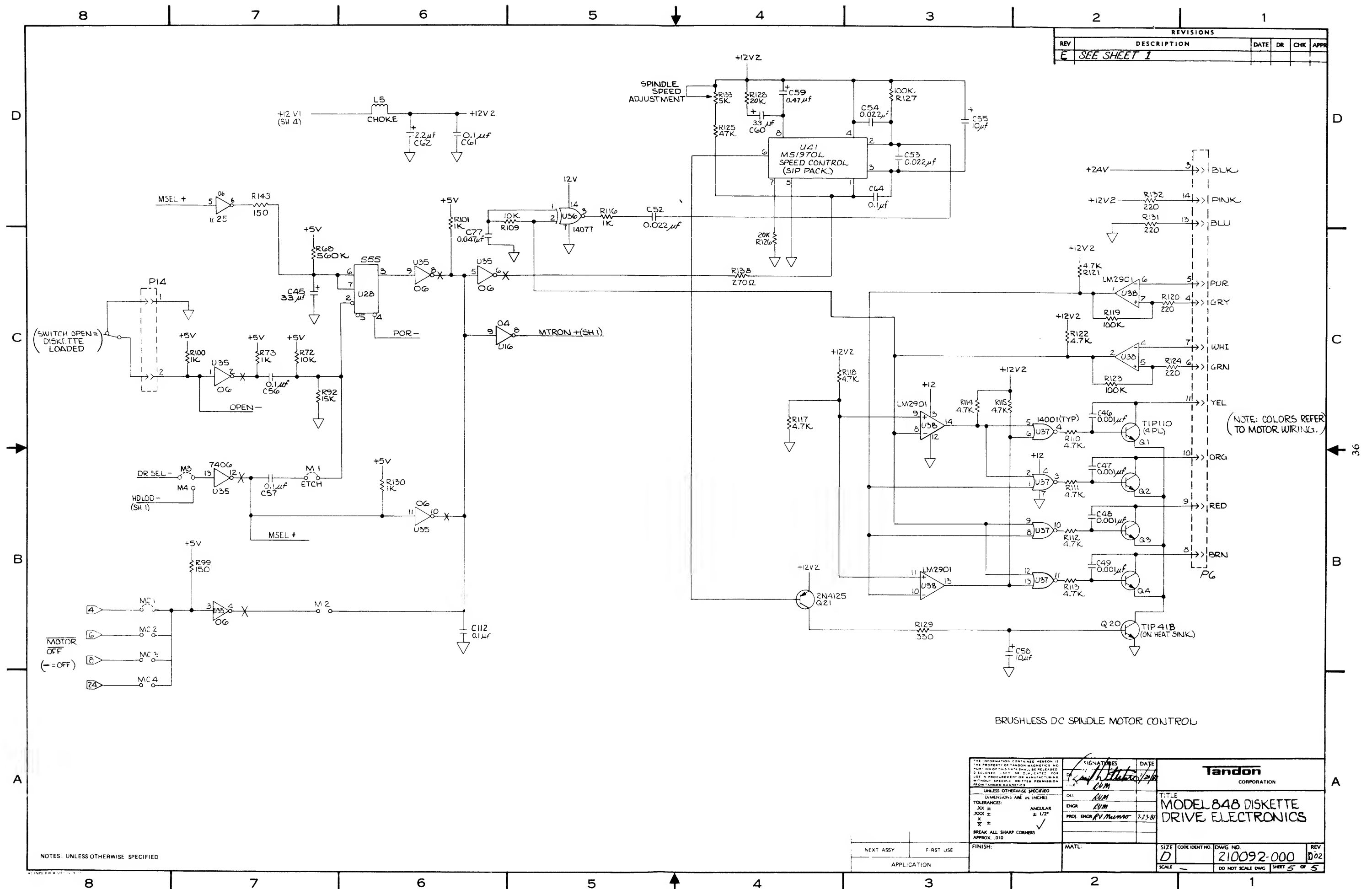
NOTES: UNLESS OTHERWISE SPECIFIED

|   |  |   |  |                            |
|---|--|---|--|----------------------------|
| THE INFORMATION CONTAINED HEREON IS THE PROPERTY OF TANDON MAGNETICS AND NO PORTION OF THIS DATA SHALL BE RELEASED OR DISCLOSED TO ANY OTHER PARTY WITHOUT THE WRITTEN PERMISSION OF TANDON MAGNETICS.  |  | SIGNATURES<br>DES. <i>RUM</i><br>ENGR. <i>RUM</i><br>PROJ. ENGR. <i>RUM</i> |  | DATE<br>7/27/81            |
| DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>.001 ±<br>.002 ±<br>.005 ±<br>.010 ±<br>.015 ±<br>.020 ±<br>.030 ±<br>.040 ±<br>.050 ±<br>.060 ±<br>.070 ±<br>.080 ±<br>.090 ±<br>.100 ±<br>.125 ±<br>.150 ±<br>.175 ±<br>.200 ±<br>.250 ±<br>.300 ±<br>.375 ±<br>.450 ±<br>.500 ±<br>.625 ±<br>.750 ±<br>.875 ±<br>1.000 ±<br>1.250 ±<br>1.500 ±<br>1.750 ±<br>2.000 ±<br>2.500 ±<br>3.000 ±<br>3.500 ±<br>4.000 ±<br>4.500 ±<br>5.000 ±<br>5.500 ±<br>6.000 ±<br>6.500 ±<br>7.000 ±<br>7.500 ±<br>8.000 ±<br>8.500 ±<br>9.000 ±<br>9.500 ±<br>10.000 ± |  | TITLE<br>MODEL 848 DISKETTE<br>DRIVE ELECTRONICS                            |  | SIZE<br>210092-000         |
| FINISH:<br>NEXT ASSY<br>FIRST USE<br>APPLICATION  |  | MATL:<br>SCALE: NONE<br>DO NOT SCALE DWG                                    |  | REV<br>D02<br>SHEET 2 OF 5 |



| REVISIONS |             |      |    |     |      |  |
|-----------|-------------|------|----|-----|------|--|
| REV       | DESCRIPTION | DATE | DR | CHK | APPR |  |
| E         | SEE SHEET 1 |      |    |     |      |  |



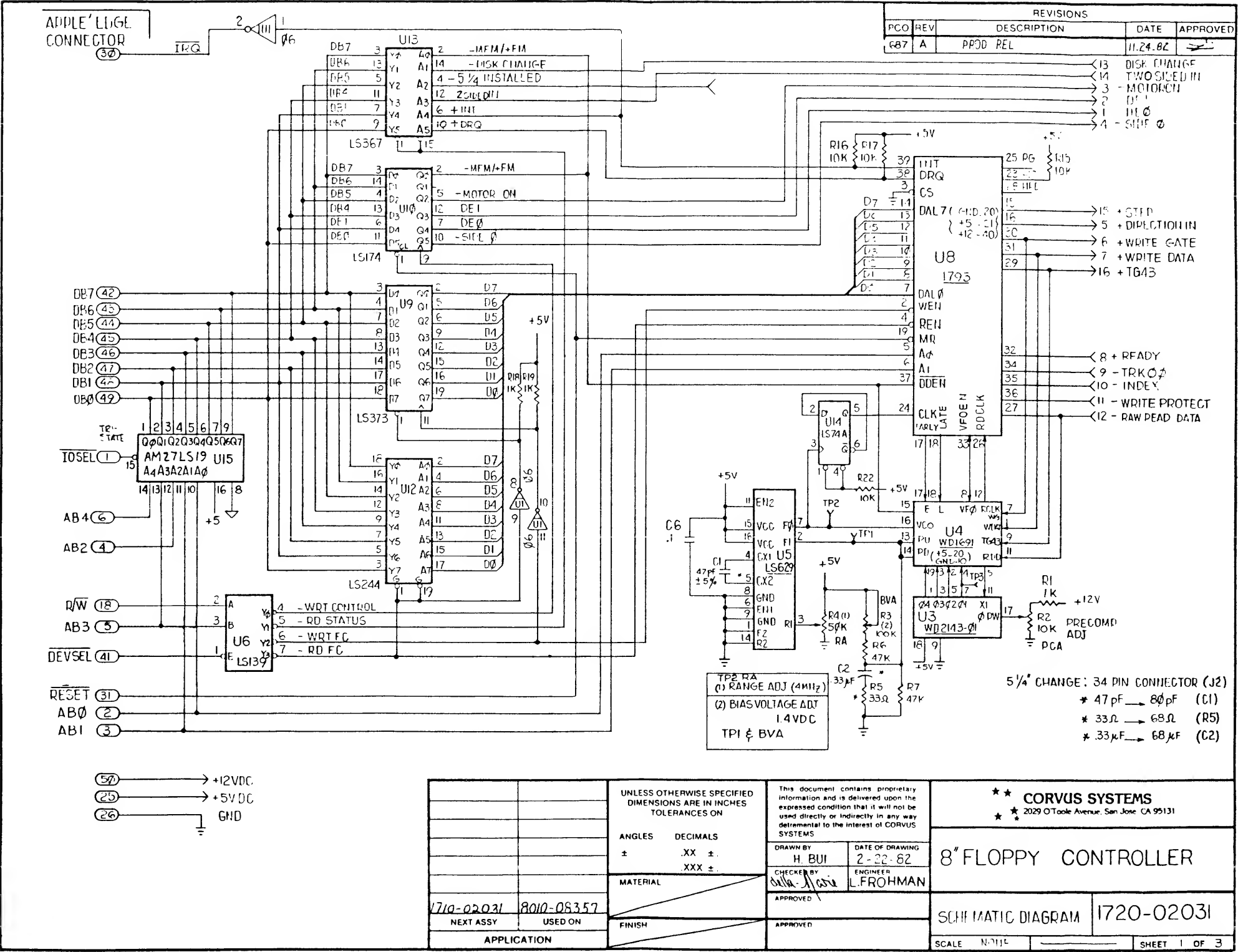




APPENDIX D  
ASSEMBLY DRAWINGS

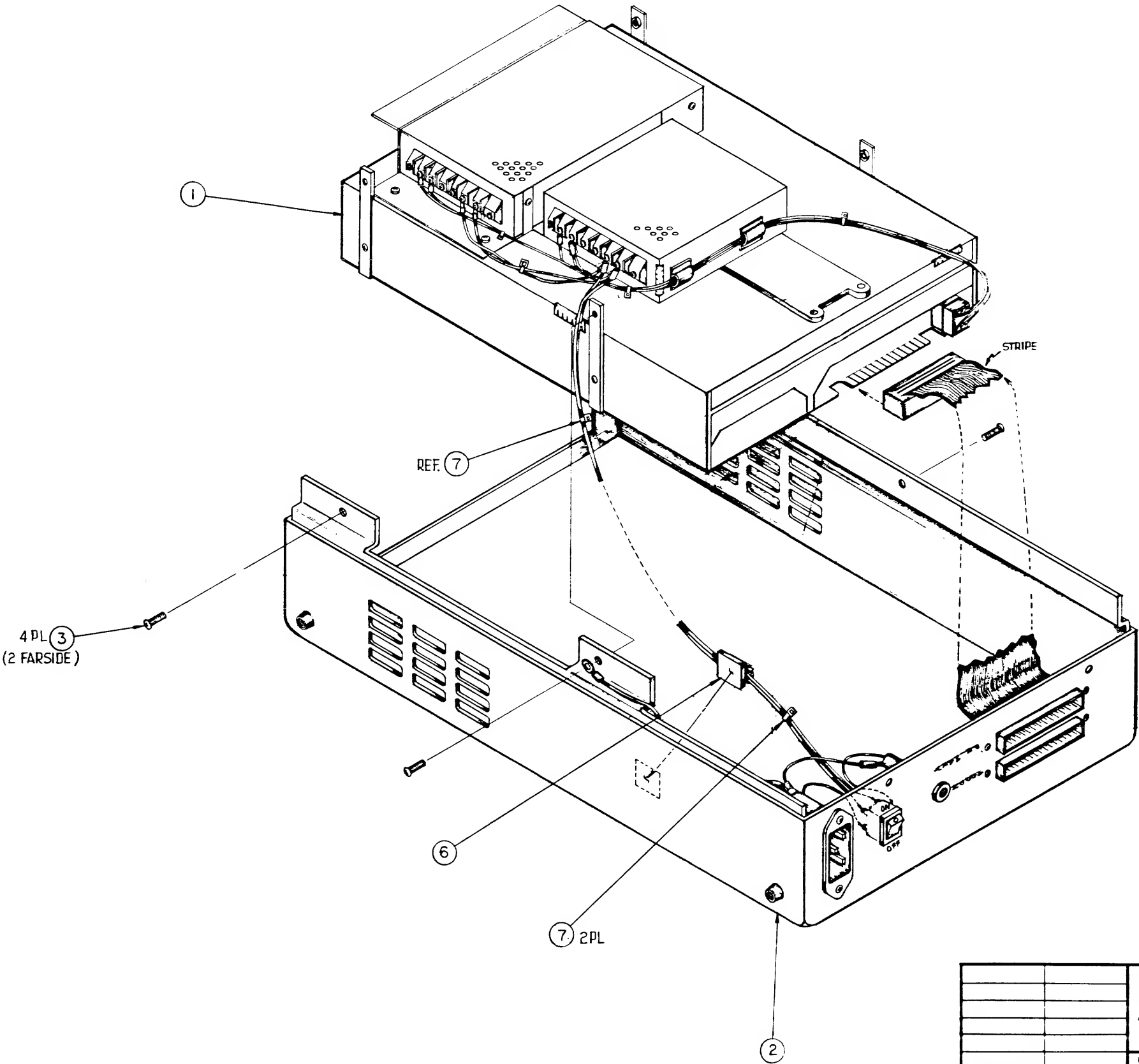
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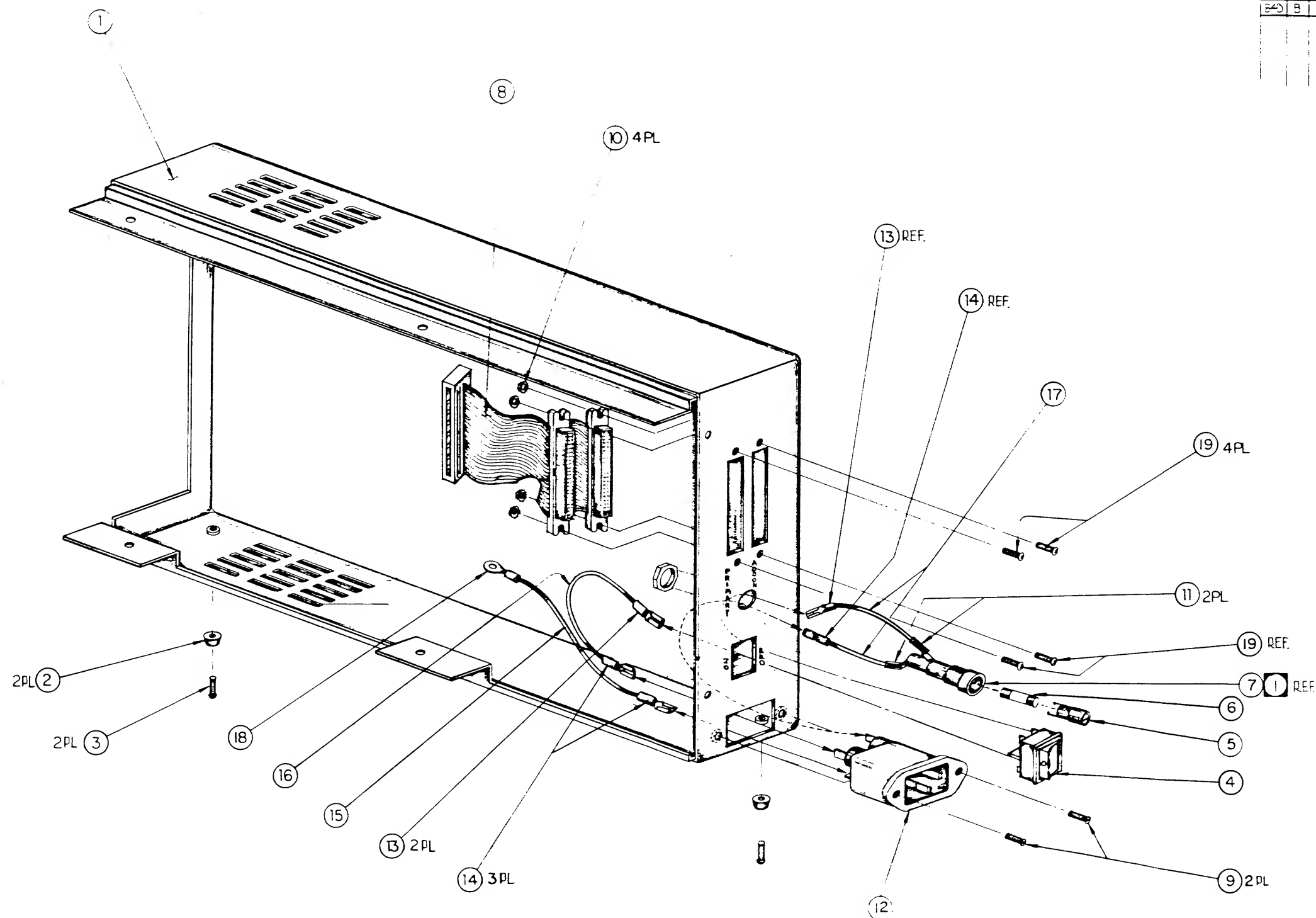



| REVISIONS |     |              |          |
|-----------|-----|--------------|----------|
| PCO       | REV | DESCRIPTION  | DATE     |
| 687       | A   | REL FOR PROD | 11-29-82 |
| 842       | B   | CHG ITEM 7   | 1-7-82   |



|             |  |   |  |   |  |   |  |
|-------------|--|---|--|---|--|---|--|
| 8005-08734  |  | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON |  | THIS DOCUMENT CONTAINS PROPRIETARY<br>INFORMATION AND IS DELIVERED UPON THE<br>EXPRESSED CONDITION THAT IT WILL NOT BE<br>USED DIRECTLY OR INDIRECTLY IN ANY WAY<br>DETRIMENTAL TO THE INTERESTS OF CORVUS<br>SYSTEMS |  | ★ ★ CORVUS SYSTEMS<br>★ ★ 2029 O'Toole Avenue, San Jose, CA 95131 |  |
| NEXT ASSY   |  | ANGLES    DECIMALS<br>±           .XX ±.<br>.XXX ±.                     |  | DRAWN BY<br>H. BUI  |  | DATE OF DRAWING<br>6-29-82  |  |
| USED ON     |  | MATERIAL  |  | CHECKED BY<br>L. FROHMAN  |  | ENGINEER<br>L. FROHMAN  |  |
| APPLICATION |  | FINISH  |  | APPROVED<br>  |  | APPROVED<br>  |  |
|             |  |   |  | ASSEMBLY: DRAWING   |  | 8010-08733  |  |
|             |  |   |  | SCALE NTS   |  | SHEET 1 OF 1  |  |

| REVISIONS |     |                        |          |          |
|-----------|-----|------------------------|----------|----------|
| PCO       | REV | DESCRIPTION            | DATE     | APPROVED |
| 687       | A   | REL FOR PROD           | 11-24-82 |          |
| 840       | B   | CHG ITEM 8, ADD NOTE 1 | 12-23-82 |          |

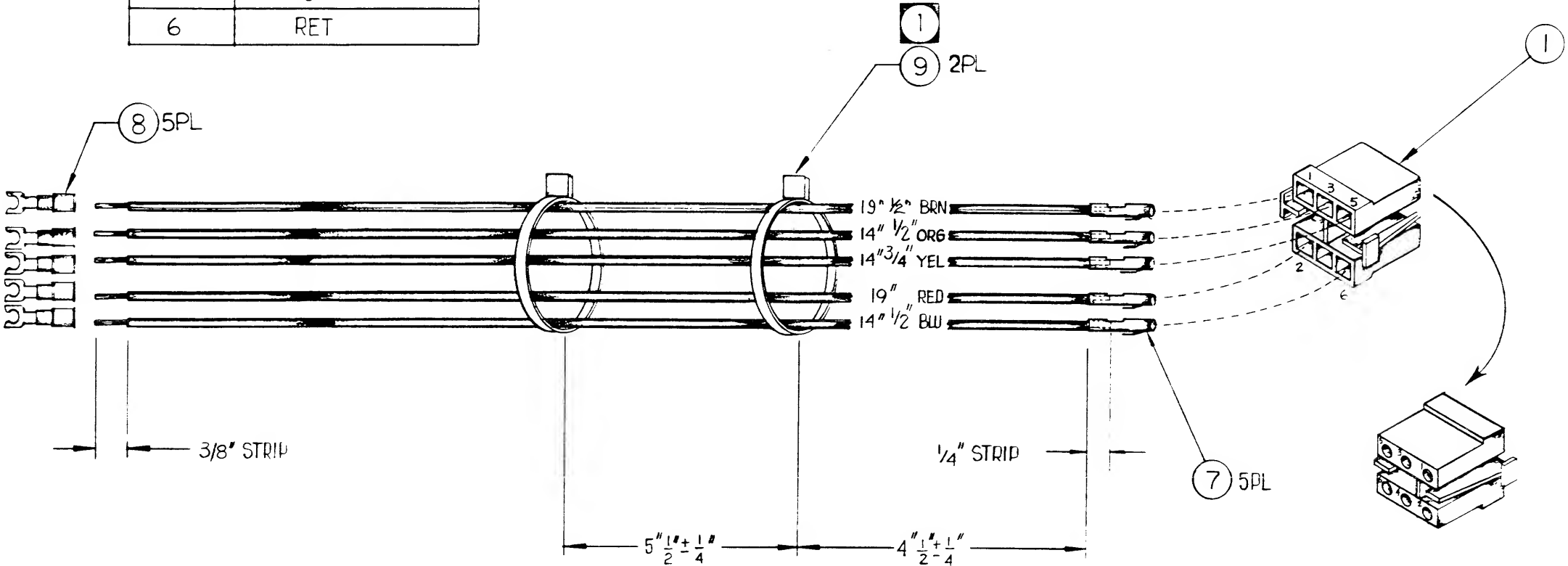


 WIRES SHOWN ON FUSE HOLDER FOR REF ONLY  
 WIRES NEED TO BE INSTALLED AFTER HOLDER IS IN LEFT COVER  
 NOTES- UNLESS OTHERWISE SPECIFIED

|  |  |   |  |  |  |   |  |
|--|--|---|--|--|--|---|--|
| 8010-08733<br>NEXT ASSY USED ON<br>APPLICATION |  | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON<br>ANGLES DECIMALS<br>± .XX ±<br>.XXX ± |  | This document contains proprietary<br>information and is delivered upon the<br>expressed condition that it will not be<br>used directly or indirectly in any way<br>detrimental to the interest of CORVUS<br>SYSTEMS.<br>DRAWN BY: H. BUI<br>DATE OF DRAWING: 8-25-82<br>CHECKED BY: L. FROMMAN<br>APPROVED: |  | ★ ★ CORVUS SYSTEMS<br>★ ★ 2029 O'Connell Avenue, San Jose, CA 95131 |  |
|  |  | MATERIAL<br>FINISH  |  | APPROVED:  |  | LEFT COVER ASSY 8" FLOPPY   |  |
|  |  |   |  |  |  | ASSEMBLY DRAWING 8010-08731   |  |
|  |  |   |  |  |  | SCALE NONE SHEET 1 OF 1   |  |



| AMP MATE-N-LOK |         |
|----------------|---------|
| PIN            | VOLTAGE |
| 1              | +24 VDC |
| 2              | RET     |
| 3              | RET     |
| 5              | +5VDC   |
| 6              | RET     |

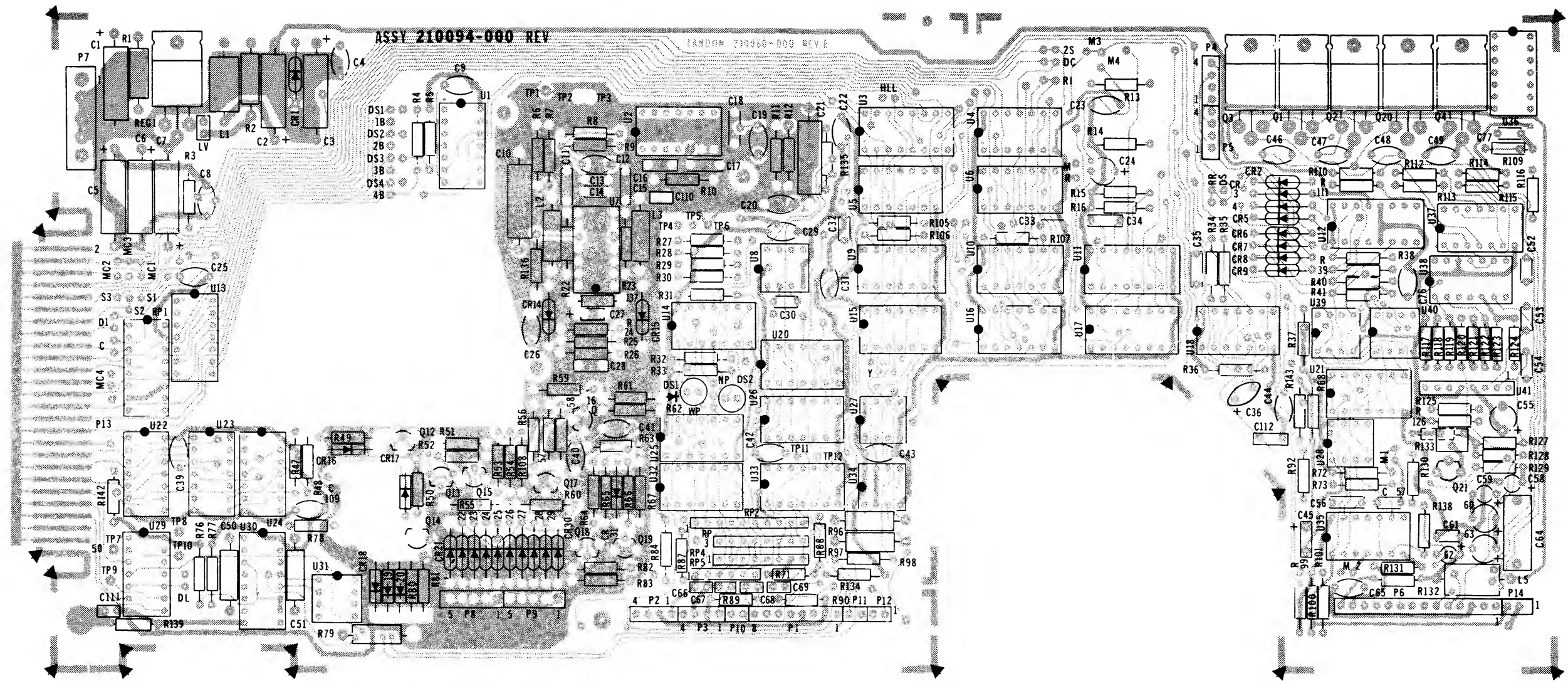
| REVISIONS |     |                        |          |          |
|-----------|-----|------------------------|----------|----------|
| PCO       | REV | DESCRIPTION            | DATE     | APPROVED |
| 687       | A   | REL FOR PROD           | 11-29-82 |          |
| 842       | B   | CHG ITEMS 2 AND 9 (LM) | 1-7-82   |          |
|           |     |                        |          |          |
|           |     |                        |          |          |



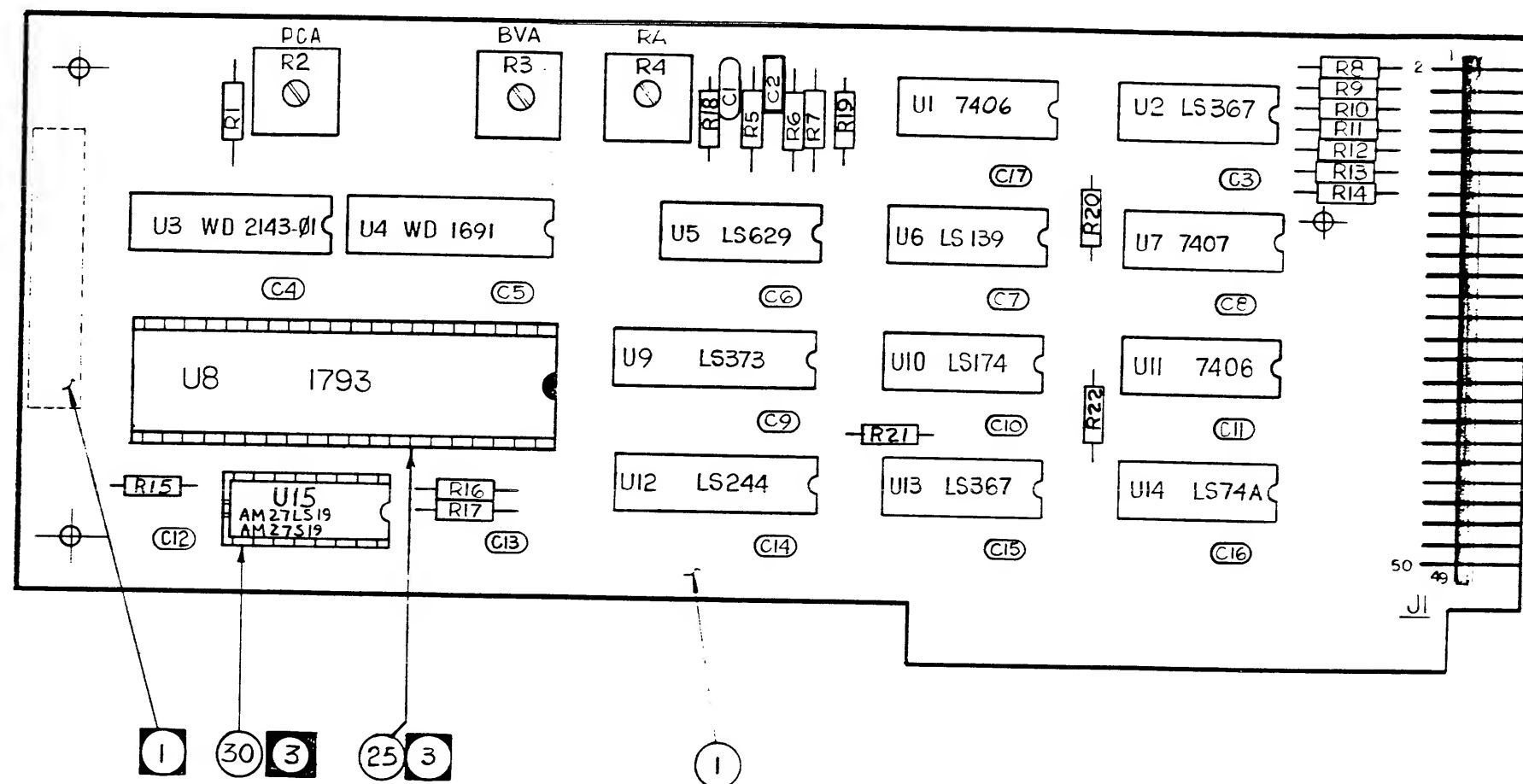
**1** SHOWN OPEN TIE WRAPS FOR CLARITY ONLY.  
WRAPS SHOULD BE PULLED TIGHTLY.

NOTES : UNLESS OTHERWISE SPECIFIED ,

|             |           |   |  |  |   |                           |   |
|-------------|-----------|---|--|--|---|---------------------------|---|
|             |           | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON | This document contains proprietary<br>information and is delivered upon the<br>expressed condition that it will not be<br>used directly or indirectly in any way<br>detrimental to the interest of CORVUS<br>SYSTEMS | ★ ★ CORVUS SYSTEMS<br>★ 2029 O'Toole Avenue, San Jose, CA 95131<br>★ ★ |   |                           |   |
|             |           |   |  | ANGLES      DECIMALS<br>±            .XX ± .<br>.XXX ± .               | DRAWN BY<br>H. BLU  | DATE OF DRAWING<br>3/5/82 | 8" FLOPPY CONTROLLER D.C.<br>CABLE ASSY |
|             |           |   |  | MATERIAL   | CHECKED BY<br>Halla - Hsu   | ENGINEER<br>L. FROHMAN    |   |
| 8010-08732  | 8" FLOPPY |   |  | FINISH   | APPROVED<br> |                           | ASSEMBLY DWG   8010-08391               |
| NEXT ASSY   | USED ON   | APPROVE:  |  |  |   |                           |   |
| APPLICATION |           |   |  | SCALE 1"=1'  |              | SHEET 1 OF 1              |   |



| REVISIONS |     |              |          |          |
|-----------|-----|--------------|----------|----------|
| PCO       | REV | DESCRIPTION  | DATE     | APPROVED |
| 687       | A   | REL FOR PROD | 11-24-82 |          |
|           |     |              |          |          |
|           |     |              |          |          |
|           |     |              |          |          |
|           |     |              |          |          |



- ③ INSTALL SOCKETS DURING ASSY-DEVICES WILL BE INSTALLED AFTER PROGRAMMING OR DURING TEST.
- 2 - SQUARE PAD INDICATED PIN1 OF IC, POSITIVE END OF CAPACITOR.
- ① PERMANENTLY MARK OR IDENTIFY REV. LEVEL APROX WHERE SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED.

|                       |  |   |  |   |  |   |  |
|-----------------------|--|---|--|---|--|---|--|
|                       |  | UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES ON |  | This document contains proprietary information and is delivered upon the expressed condition that it will not be used directly or indirectly in any way detrimental to the interest of CORVUS SYSTEMS |  | ★ ★ CORVUS SYSTEMS<br>★ ★ 2029 O'Toole Avenue, San Jose, CA 95131 |  |
|                       |  | ANGLES    DECIMALS<br>±        .XX ±<br>.XXX ±                          |  | DRAWN BY<br>H. BUI  |  | DATE OF DRAWING<br>3/5/82   |  |
|                       |  | MATERIAL  |  | CHECKED BY<br>  |  | ENGINEER<br>LFROHMAN  |  |
|                       |  | FINISH  |  | APPROVE:  |  | 8" FLOPPY CONTROLLER ASSY   |  |
| 8005-08734 8005-08734 |  |   |  | APPROVED  |  | ASSEMBLY DWG  |  |
| NEXT ASSY             |  | USED ON   |  |   |  | 8010-08357  |  |
| APPLICATION           |  |   |  |   |  | SCALE 1:1   |  |
|                       |  |   |  |   |  | SHEET 1 OF 1  |  |